



THE
NATURAL HISTORY
OF
QUADRUPEDS.

To which is Prefixed,
The History of the Earth—Its Form and Composition—Of
Attraction—Repulsion—Element—Heat—Air—Water
—Hills—Seas—Lakes—Rivers—Tides—Hurricanes—
Whirlwinds—Waterspouts—Volcanoes—Earthquakes—

AND
MAN,

ADORNED WITH 64 ENGRAVINGS ON WOOD.



LONDON,

PRINTED BY A. MACPHERSON, RUSSELL COURT, COVENT GARDEN.
For the Booksellers.

1804

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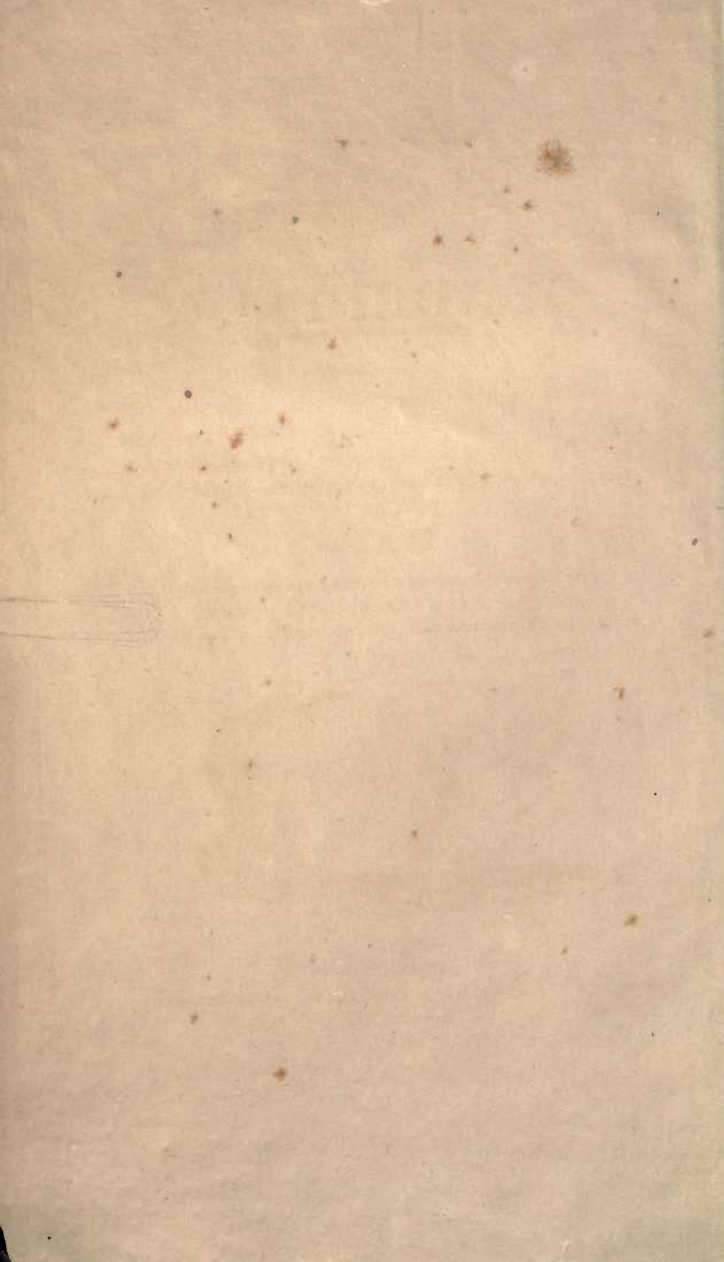
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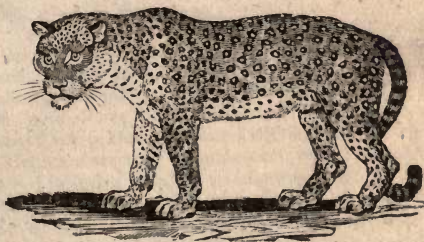
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THE
NATURAL HISTORY
OF
GUADALUPE.

TO WHICH IS ADDED
A HISTORY OF THE FAUNA—ITS TOWN AND COUNTRY—OF
AGRICULTURE—REPTILES—MINERAL—HEAT—AIR—WATER
—HILLS—SEA—LAKES—RIVERS—TIDES—HURRICANE—
—WINDS—VOLCANOS—EARTHQUAKES—

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NATURAL HISTORY.

CHAP. I.

OF THE EARTH---ITS FORM AND COMPOSITION---OF ATTRAC-
TION---REPULSION---ELEMENTS---HEAT---AIR---WATER.

IT is universally allowed, that practical observations on any subject are far superior to those which are founded only in speculation: tho' it is equally true, that real practice owes its existence to theory. Many writers of respectability both at home and abroad, have attempted to write theories of the earth, but with what success I shall not determine. Our present business shall be to state such facts as have received general approbation, and to adduce such others as cannot fail to give the reader pleasure and satisfaction.

The globe which we inhabit, presents the beholder with heights, depths, plains, seas, marshes, rivers, caverns, gulfs, and volcanos, in the disposition of which we observe neither regularity nor order. If we penetrate the bowels of the earth, we discover metals, minerals, stones, bitumens, and matter of every kind, as it were, without any apparent design. Upon a more accurate inspection, we perceive matter combined in such a chaotic manner that it can be compared to nothing but the ruins of a world.

Amid these ruins, however, the different generations of animals, and of vegetables succeed each other in a beautiful and regular order. With respect to us, the earth formerly a chaos, is now become a delightful habitation, where every object affords amazing displays of the power, intelligence, and beneficence of its great Creator.



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In describing the surface of the earth, the first object that solicits our attention, is that immense body of water with which the greater part is covered. The waters occupy the lower grounds, and, notwithstanding their uniform tendency to rest, they are kept in continual agitation by an agent, that communicates to them a regular periodic motion which produces a vibration throughout the whole mass.

When we explore the bottom of the sea, we discover hills and valleys, plains and hollows, and rocks and earths of every kind. We see that islands are only the summits of vast mountains; we likewise find mountains whose tops almost reach the surface of the water; and rapid currents which counteract the general movement; the motions of which are sometimes direct, and at others retrograde. On the one hand, we meet with tempestuous regions, where the heavens and the ocean seem equally confounded in the general shock; violent intestine commotions, tumultuous swellings, waterspouts, and strange convulsions produced by volcanoes and dreadful whirl-pools: on the other we discover vast regions always calm, but equally dangerous to the mariner: and if we direct our eyes towards the polar regions, we find huge masses of ice, (which having detached themselves from the great mountains which have been formed there from time immemorial) advancing in a formidable manner, until they dissolve in the temperate climates.

Besides these grand objects, the ocean exhibits an infinite variety of animated beings; all of which find abundance of food in this fluid element.

But when we take a view of the land: what a difference takes place in different climates! what a variety of soils! what inequalities in the surface! Yet from attentive observation, we find great chains of mountains lie nearer the equator than the poles; that, in the old Continent, their direction is more from east to west than from north to south: and the figure and direction of these mountains which appear most irregular, correspond so, that the prominent angles of one mountain are constantly opposite to the concave angles of the neighbouring mountain, and of equal dimensions, whether they be separated by an extensive plain or a small valley. I have also remarked, that the opposite are almost always of the same height; and that mountains for the most

part occupy the middle of continents, islands and promontories, and that they divide them by their greatest lengths. By tracing the courses of the principal rivers too, I find that their direction is nearly perpendicular to the sea-coasts into which they empty themselves, and that for the greater part of their courses they follow the direction of the mountains whence they take their rise. The sea-coasts are generally bordered with earth and sand accumulated by the waters of of the sea, or swept down by rivers. In opposite coasts separated only by small arms of the sea, the different strata are of the same materials. Volcanoes never exist but in high mountains; a great number of which are entirely extinguished; some are connected with others by subterraneous passages, and their eruptions frequently happen at the same time. Similar communications subsist between certain lakes and seas: and some rivers disappear on a sudden and seem to precipitate themselves into the bowels of the earth. There are certain inland seas also, which constantly receive from rivers prodigious quantites of water and which as their bounds are not augmented, probably discharge those extraneous supplies by subterraneous passages. Countries that have been long inhabited may likewise be easily distinguished from those which are less so, from their rude appearance and uncultivated state.

In our examination of the upper stratum of the earth, we find it to be universally of the same substance, which is nothing else but a composition of the decayed parts of animal and vegetable bodies. Penetrating a little deeper, we discover the real earth, beds of sand, lime-stone, clay, shells, marble, gravel, chalk, &c. These strata are always parallel to one another, and of the same thickness throughout. In neighbouring hills, strata of the same materials are uniformly divided by perpendicular fissures. Shells, skeletons of fishes, marine plants, &c. perfectly similar to those of the ocean, are often found in the bowels of the earth, and on the tops of mountains at a very great distance from the sea. Petrified shells are found almost every where in prodigious quantities, not only inclosed in rocks of marble and lime-stone, in earths and clays, but incorporated and filled with the same substance with which they are inclosed. Indeed all marbles, lime-stones, chalks, marles, clays, sands, and almost

all terrestrial substances, are full of shells and other spoils of the ocean.

Without dwelling any longer upon these particulars, I shall confine myself to well authenticated facts. It is certain, that the waters of the sea have, at one period or another, continued for a succession of ages upon what we now know to be dry land; and that, of consequence, the vast continents of Asia, Europe, Africa, and America, were then the bottom of an immense ocean, replete with every thing which the present one produces. It is also certain that the different strata of the earth are horizontal and parallel to one another; which situation is occasioned by the operation of the waters. The horizontal position of water is almost universal: in plains the strata are perfectly horizontal. And it is only in the mountains that they are inclined to a horizon; because they have been originally formed by sediments deposited upon an inclined base. Now these strata must have been formed gradually; for nothing is more frequent than strata composed of heavy materials placed above light ones, which could not have been the case, if the whole had been blended and dissolved by the deluge, and then precipitated.

Another circumstance requires our attention. Nothing but the motion and sediments of water could possibly produce the regular position of the various strata of which the superficial part of this earth is composed. And as both the highest mountains, and the lowest vallies consist of parallel strata, this parallel and horizontal position of strata must be the effect of an uniform and constant cause. And hence we conclude that the dry and habitual part of the earth has remained a long time under the waters of the sea, and must therefore have undergone the same changes which are at present going on at the bottom of the ocean. By examining therefore what passes in the bottom of this sea, we shall soon be able to draw some rational conclusions respecting the external figure and internal constitution of the earth.

The ocean, since the creation, has been subject to a regular flux and reflux. This motion which uniformly takes place twice in twenty four hours, is principally owing to the moon, and is greater in the equatorial regions than in remote climates. The earth too performs a rapid motion on its axis, and consequently has a centrifugal force, which is

also the greatest at the equator; which last circumstance proves, that the earth must be more elevated under the equator than at the poles. From the tides, therefore, and the motion of the earth combined, we may fairly conclude, that though this globe had originally been a perfect sphere, its diurnal motion, and the ebbing and flowing of the tides, must in a succession of time, have elevated the equatorial parts, by gradually carrying mud, shells, &c. from other climates, and depositing them at the equator. On this hypothesis, the greatest inequalities on the earth's surface ought to be found and indeed are found near the equator. But farther, as the alternate motion of the tides has been regular since the existence of the world, may we not naturally imagine, that at each tide, the water carries from one place to another a small quantity of matter, which falls to the bottom as a sediment, and forms those horizontal and parallel strata that every where appear.

It may however be objected, that as the flux is equal to, and regularly succeeded by the reflux, the two motions will balance each other, and, of consequence this cause of the formation of strata must be chimerical, as the bottom of the ocean can never be affected by an uniform alternate motion of the waters.

But, in the first place, the alternate motions of the water are far from being equal, as the sea has a continual motion from east to west, and also as the winds produce great agitations, and consequently inequalities in the tides. By every motion of the sea too, particles of earth and other materials must be carried from one place and deposited in another; and these collections of matter must assume the form of parallel and horizontal strata. Besides, on all coasts where the ebbing and flowing are discernible, numberless materials are brought in by the flux, which are not carried back by the reflux. Thus the sea gradually advances in some places, and recedes from others. But in order to remove every doubt, let us examine more closely the possibility of a mountain being formed at the bottom of the sea, by the motion and sediments of the water. On a coast which the sea lashes with violence, some part of the earth must be carried off by every stroke of the waves; even where the sea is bounded by rocks, it is a well authenticated fact, that

that small particles are carried from them by the retreat of every wave. Those particles of earth or stone being transported to some distance; it happens, that when the agitation of the water is abated, the particles are precipitated in the form of a sediment, and lay the foundation of a first stratum which will soon be succeeded by a similar one. In process of time, this gradually accumulating mass will become a mountain in the bottom of the sea, perfectly like, both in external and internal structure the mountains on the dry land. When the bottom of the sea too, at particular places, is troubled by the agitation of the water; earth, clay, shells, and other matter, must be removed from thence, and deposited elsewhere. For many assure us, that the bottom of the sea, at the greatest depths to which they have descended, is so strongly agitated by the water, that earth, clay and shells are removed to great distances. Transportations of this kind must therefore go on in every part of the ocean; and the matter transported, after having subsided, must raise eminences similar to the composition and structure of our mountains. We must not however imagine that such matter cannot be carried to a great distance; for we daily find grain, and other productions of the East and West Indies landing on our coasts. These bodies may be said to be specifically lighter than the water, and the other substances specifically heavier. Yet as they are reduced to an impalpable powder, they may be long suspended in the water, and consequently transported to any distance.

It has been imagined, that the agitation, produced by the winds and tides, does not affect the bottom where it is very deep. But the truth is, that whatever be the depth, the power which occasions the flux and reflux operates equally upon every particle of the mass at the same time. It therefore appears, that the tides, the winds, and whatever else gives birth to the motion of the sea, must naturally produce heights and inequalities at the bottom; and that these eminences must uniformly be composed of regular strata, either horizontal or inclined.

Whenever eminences are formed, they interrupt the uniform motion of the waters, and produce new ones called currents. Between two neighbouring heights in the bottom of the ocean, there must be a current, which will follow

their common direction, and like a river, cut a channel, the angles of which will be alternately opposite through the whole of its course. These heights must of consequence increase, as the water will deposit its ordinary sediment upon their ridges; and thus by means of the different motions and sediments, the bottom of the ocean, though formerly smooth, must soon be furrowed, and interspersed with hills, and chains of vast mountains, as we find it at present. And the materials which consisted of sandy and crystalline particles, would produce those masses of rock and flint in which we find crystals and other precious stones. Others composed of stony particles and shells, produce lime-stone and marble; and lastly, particles of shells mixed with pure earth, have given rise to all our beds of marle and chalk.

It may be said however, that great numbers of hills, whose summits consist of solid rock of moor stone, or marble, are founded upon small eminences composed of lighter materials. But the explication of this phenomenon is perfectly easy. The waters would first operate upon the upper stratum, either of coasts, or the bottom of the sea. This upper stratum generally consists of clay or sand; and these light substances being carried off and deposited sooner than the more dense and solid, they would of consequence become foundations for the more heavy particles to rest upon. The harder and more ponderous substances would next be subjected to the attrition of the water, and carried off and deposited about the hillocks of sand or clay. These small stony particles would, in process of time, form those solid rocks which we now find on the tops of hills and mountains. And as particles of stone are heavier than those of either sand or clay, it is probable that they were originally covered by superior strata of considerable depth; but that they now occupy the highest stations, because they were last transported by the waves.

To confirm this reasoning, it is worthy of remark, that, the different strata of stones in quarries are almost all horizontal or regularly inclined. Indeed the strata of granite, vitrifiable sand, clays, marbles; calcareous stones, chalk, and marles, are always parallel or equally inclined. And, the disposition of strata, as far as mankind have penetrated is the same.

Those beds of sand and gravel which are washed from the mountains, must, in some degree, be excepted. And as they are formed by rivers and brooks which often change their channels, it is not surprizing that they are so frequent. The strata formed by rivers are not very ancient; they are easily distinguished by their frequent interruptions, and the inequality in thickness, which is constantly varying, but the ancient strata uniformly preserves the same dimensions throughout. The modern strata may likewise be distinguished by the form of the stones and gravel they contain, which bear evident marks of having been rounded by the motion of the water. The same observation holds good with respect to those beds of turf, and corrupted vegetables, which are found in marshy grounds, immediately below the soil; and which have derived their origin from successive accumulations of decayed trees, and other plants. The strata of slime and mud being formed by stagnated waters, or the inundations of rivers, are neither so perfectly horizontal, nor so uniformly inclined, as those produced by the regular motions of the sea. In strata formed by rivers, we meet with river but seldom with sea shells; in the ancient strata there are no river shells; the sea shells are numerous, well preserved and all placed in the same manner. From whence then could this beautiful regularity proceed? Instead of regular strata, why do we not find the materials which compose the earth huddled together without order? Why are not rocks, marbles, clays, marles, &c. scattered promiscuously, or joined by irregular or vertical strata? Why are not heavy bodies found in a lower situation than light ones? It is easy to perceive, that this uniformity of nature, this species of organization, this union of different materials by parallel strata, without regard to their weight, could only proceed from a cause equally powerful and uniform as the motions of the sea, produced by regular winds, or by the flux and reflux, &c.

As these causes act with superior force under the equator than in other climates, chains of mountains are of consequence proportionately extensive. Thus the mountains of Africa and Peru are both the highest and most extensive in the world. The mountains of Europe and Asia, which extend from Spain to China, are not so high as those of

Africa and South America. Besides, in the northern seas, the islands are but few, when compared with those in the Torrid Zone. As islands, therefore, are nothing but the summits of mountains, it is clear, that there are more inequalities of the earth near the equator, than in the northerly climates.

Those vast chains of mountains which run from west to east in the old continent, and from north to south in the new, must have been formed by the general motion of the tides. But the origin of the smaller mountains and hills may be ascribed to particular motions occasioned by winds, currents, and other irregular agitations of the sea, or to a combination of those motions, which are capable of infinite variations.

But how has it happened, that this earth, which, from time immemorial, has been an immense continent, should, if formerly the bottom of an ocean, be now so much elevated above the waters, and so completely separated from them?

A little reflection will furnish us with at least a plausible solution. We daily find the sea gaining ground on certain coasts, and losing it on others; that the ocean has a general and uniform motion from east to west; that there are whole provinces which human industry can hardly defend from the fury of the waves, and that there are islands which have but lately emerged from the waters, and regular inundations. History also informs us of inundations and deluges of a more extensive nature. Should not all these occurrences convince us, that the surface of the earth has undergone very great revolutions, and that the sea may have given up great quantities of ground which it formerly possessed? Let us suppose for example, that the old and new worlds were formerly but one continent, and that, by a violent earthquake, the ancient Atalantis of Plato was sunk. What would be the consequence? The sea would rush in from all quarters, and form what is now called the Atlantic Ocean, leaving vast continents entirely dry. This great revolution might be effected by the sudden failure of some immense cavern in the interior part of the globe, and an universal deluge would infallibly succeed. I am inclined how-

ever to think, that to effect such a revolution would require a very long period. Be these conjectures as they may, it is certain that such a revolution has happened, and I believe it to have been a natural production. In consequence of the aforesaid motion, the Pacific Ocean must make continual efforts against the coasts of Tartary, China and India; the Indian Ocean must act against the eastern coast of Africa; and the Atlantic must operate in a similar manner upon the eastern coast of America. Hence the regular incursions of the sea on the east and its departure on the west. If such is the natural effect of this motion of the sea, may we not suppose, that Asia and all the eastern continent is the most ancient country in the world? and that Europe and part of Africa, particularly the western parts of these continents, as Britain, France, Spain, &c. are more recent countries.

There are also many parts of the earth below the level of the sea, which being defended only by banks, must by the continual action of the water gradually waste away; and of consequence, soon become part of the ocean. The mountains too are daily diminishing; and every little brook carries earth, and other materials from the high grounds into the rivers, by which they are at last transported to the ocean. Thus the bottom of the sea is gradually filling up, and the surface of the earth approaching to a level.

But we shall give a detail of facts in order to explain the different alterations the earth has undergone, whether by irruptions of the sea, or by its retreat from lands which it formerly occupied.

The irruption which gave birth to the Mediterranean is no doubt the greatest. The motion of the water through the straits of Gibraltar is contrary to the motion through every other strait; it being from west to east. This circumstance is a demonstrative proof, that the Mediterranean Sea is not an ancient gulf, but that it has been formed by an irruption, produced by some accidental cause.

When the ocean forced this passage, it ran through the straits with much more rapidity than it does now, and immediately deluged that large tract of land which formerly joined Europe with Africa. The waters covered all the grounds which were lower than the level of the ocean; and no part of them is to be seen at present, except the tops of

some of the mountains, such as part of Italy, Sicily, Malta, Corsica, Sardinia, Cyprus, Rhodes, and the islands of the Archipelago.

It is not improbable, but that the Black Sea will, some time or other, be entirely separated from the Mediterranean; and that the Bosphorus will be choaked up, whenever the rivers shall have accumulated a quantity of materials sufficient for that purpose.

The Caspian and Black Seas should rather be accounted lakes than gulfs of the ocean; because they are perfectly similar to the other lakes that receive a number of rivers without any visible outlets, as the Dead Sea, several lakes in Africa and elsewhere.

We will now give some recent examples of the changes of sea into land and of land into sea. At Venice, the bottom of the sea is constantly rising. And the same thing may be said, of most harbours, bays, and mouths of rivers. In Holland the bottom of the sea is elevated in many places, the gulf of Zudovzee and the straits of the Texel, cannot receive such large vessels as formerly; and it is quite evident that the sea is always dammed up, wherever great rivers empty themselves. The Rhine is lost in the sands which itself has accumulated. The Danube, the Nile, and all large rivers, after they have transported great quantities of slime, sand, &c. never arrive at the sea by a single channel. Marshes are drained every day; lands, forsaken by the sea, are plowed and sown; and we navigate whole countries now covered by water. In short, we see so many instances of this nature, that they are sufficient to convince us, that in time, the gulfs of the ocean will become continents; isthmuses changed into straits; and the tops of mountains converted into shoaly rocks in the sea.

Still, however, those perpendicular fissures, which are equally diffused through rocks, clays, and every constituent part of the globe, remain to be considered. The perpendicular fissures are indeed placed at greater distances from one another, than the horizontal; and the softer the matter, the more distant are the fissures. In marble and hard stone, the fissures are only a few feet asunder. If the mass of rock be extensive, the distance between the fissures is some fathoms.

The cause of perpendicular fissures is easily investigated. As various materials constituting the different strata were transported by the waters, and deposited in the form of sediments, they would at first be in a very diluted state, but by degrees would harden and part with the water they contained. In the process of drying, they would contract and split at irregular distances. The contraction, therefore of the parts in drying, is the cause of perpendicular fissures; for I have often remarked, that the sides of those fissures, through their whole extent, correspond as exactly as the two sides of a split piece of wood.

Perpendicular fissures vary greatly as to the extent of their openings. It is clear, however, that the fissures, whose openings are small, have been occasioned solely by drying. But those which extend several feet are partly owing to the sinking of the foundation upon one side, while that of the other remained firm. When rocks are founded on clay or sand, they sometimes slip a little a side; and the fissures are of consequence increased by it. I have not taken notice of those prodigious cuts which are found in rocks and mountains, which could be produced by nothing but the sinking of immense subterraneous caverns that were unable to support the pressure of earth any longer. But these cuts in mountains are not of the same nature with perpendicular fissures: they appear to have been ports opened by the hand of nature for the communication of nations. This appears to be the intention of all large openings in chains of mountains, and of those straits by which different parts of the ocean are connected; as the straits of Thermopyle, of Gibraltar, &c. the gaps or ports in Mount Caucasus, the Cordeliers, &c.

These great sinkings, though owing to accidental and secondary causes, are leading facts in the history of the earth, and have contributed much to change the appearance of its surface. Most of them have been produced by subterraneous fires, whose explosions gave birth to earthquakes and volcanoes. But though the force of inflamed matter pent up in the bowels of the earth be great, and though its effects appear to be prodigious, we cannot suppose that these subterraneous fires are only branches of an immense abyss of flame in the centre of the earth: nor do we believe that

those fires have their seat at a great depth from the surface, as matter cannot begin to burn, or at least the inflammation cannot be supported without air. In order to be convinced that the matter emitted by volcanoes does not come from any considerable depth, we have only to attend to the height of the mountain, and to consider the amazing force which would be necessary to project stones and minerals to the height of half a league; for *Ætna*, *Hecla*, and other volcanoes have at least that elevation.

This, however, is not inconsistent with volcanoes being the cause of earthquakes; nor does it contradict the communication of one volcano with another, by means of subterraneous passages. For to produce an earthquake in a plain, it is not necessary that the bottom of the volcano should be below the level of that plain, nor that there should be subterraneous cavities filled with the same burning matter under it. A violent explosion may by its re-action produce an earthquake of a considerable extent. I would not, however, be thought to say, that no earthquakes derive their existence from subterranean fires; all I mean is, that there are earthquakes produced solely by the explosion of volcanoes.

It is not difficult to account for volcanoes appearing only in mountains; for greater quantities of minerals, sulphur, and pyrites exist in mountains and nearer the surface than in the plains. Besides, mountains are more subject to the impressions of the air, and receive more rain and moisture, by which mineral substances are fermented to such a degree as to produce actual inflammation. And mountains having diminished, nearly in proportion to the quantity of matter thrown out, is another proof, that volcanoes are not so deep as the bases of the mountains, nay, that they are not much below their summits.

In several places, earthquakes have formed considerable hollows, and even some large gaps in mountains. All other inequalities are co-eval with the mountains themselves, and owe their existence to currents in the ocean: hence it is easy to perceive, how much subterraneous fires have contributed to change both the surface and internal part of the globe.

The most considerable changes upon the surface of the earth are produced by rains, rivers, and torrents from the

mountains. These derive their origin from vapours exhaled from the ocean, which are diffused by the winds through every climate; where they accumulate into clouds, and descend in the form of rain, which by its intrinsic gravity, runs to the bottom of the mountains, penetrating and dissolving the lower grounds, and thereby sweeping along with it sand and gravel, furrowing the plains, and thus opening passages to the sea, which always gains as much water by rivers, as it loses by evaporation. The windings in the channels of rivers uniformly have corresponding angles on their opposite banks; and, as mountains and hills, which may be considered as the banks of the valleys by which they are separated, have also sinuosities with corresponding angles, this circumstance seems to demonstrate, that the valleys have gradually been formed by currents of the ocean, in the same manner as the channels of rivers have been produced.

The waters which run upon the surface, compose perhaps not one half of the quantity that is produced by exhalation. In almost all the valleys and low grounds, at a certain depth, water is uniformly to be found; but, in high grounds, it is impossible to extract water from the bowels of the earth. There are extensive countries, where no wells can be obtained. In the east, and especially in Arabia, Egypt, and Persia, wells and springs are seldom to be met with. To supply the place of which, the inhabitants have been obliged to make large reservoirs to collect the rain water. In plain countries, furnished with large rivers, it is almost impossible to break the surface of the earth without finding water.

The greatest part of the water so liberally diffused through low grounds, comes from the neighbouring hills and eminences. During great rains, or the sudden melting of snow, part of the water runs upon the surface; but most of it penetrates the earth and rocks by small chinks and fissures. It emerges indeed as soon as it can find an opening; but it often creeps along until it can find a bottom of clay, or hard earth, and there forms subterraneous lakes, brooks, and perhaps rivers, the channels of which are consigned to eternal oblivion.

There are several lakes which neither receive nor give origin to any rivers. There are others, which though they receive no considerable rivers, are the sources of the largest

in the world. Such are the lakes from whence the river St Laurence arises; the lake Chiame, from whence two large rivers proceed, that water the kingdoms of Asem, and Pegu; the lakes of Assinboil in America; those of Oзера in Muscovy; and those which give rise to the Bog, the Irtis, and many more.

The water which falls upon elevated situations, must, after penetrating the earth, from the declivity of the ground; break forth at many places, in springs and fountains: and of consequence little water will be found in the bowels of mountains. But, in plains, as the water filtrated through the earth can find no vent, it must be collected in subterraneous caverns, or dispersed in small veins among sand and gravel. The bottom of a pit or well is only an artificial basin, into which the water empties itself from the higher grounds. Hence it is, that though water may be found in any part of a plain, only a number of wells can be supplied in proportion to the quantity of water diffused, or rather to the extent of the higher grounds from whence it proceeds.

To find water, it is unnecessary to dig below the levels of rivers. Even that which is found in the earth below such levels, doth not proceed from them.

From what has been advanced, we may conclude, that the flux and reflux of the ocean have produced all the mountains, valleys, and other inequalities on the surface of the earth; that currents of the sea have scouped out the valleys, elevated the hills, and bestowed on them their corresponding directions; and that the waters of the ocean by transporting and depositing earth, &c. have given existence to the parallel strata; and by diminishing the heights of mountains, filling up the valleys, and choaking the mouths of rivers, they will restore the earth to the sea, which, by its natural operations, will again create new continents, beautifully diversified with mountains and valleys, and in every respect like those which we now inhabit.

The surface of the globe is divided into two immense bands of earth, and two of water. The principal band is that which is called the ancient continent, including Europe, Asia, and Africa. The distance between its two extreme points, if measured from the most eastern point of Tartary to the Cape of Good Hope, will produce a line of 3600 leagues;

and if measured directly from north to south, we shall find there are only 2500 leagues from the northern Cape of Lapland to the southermost point of the Cape of Good Hope. The utmost breadth of this continent, that is, from the western coast of Africa to Trefana, as far as Nisingpo, on the east coast of China is, about 2800 leagues.

Another line may be drawn also from Brest in Brittany, as far as the coast of Chinese Tartary, which will be about 2300 leagues. The old continent, from the best estimations may be said to contain 4,940,780 square leagues, which is about a fifth part of the surface of the globe, and may be considered as a large belt of earth, with an inclination to the equator of about 30 degrees.

The new continent of America is divided into north and south. Its greatest length is from the mouth of the river Plata in Paragua to the lake of Asseniboils, which amounts to about 2500 leagues. It is supposed to contain 2,140,212 square leagues. The whole superficial content, therefore, of both the old and new continents, is about 7,080,993 square leagues, not near a third of the surface of the globe, which contains 25,000,000.

Of these lines, which divide both continents into two equal parts, it is worthy of remark, that they both terminate in the same degree of north and south latitude; and that the two continents make mutual advances towards each other, to wit, those on the African coast, from the Canary Isles to Guinea; and those of America, from Guiana, to the mouth of the Rio-Janeiro.

It therefore appears, that the most ancient lands are those, which extend from 200 to 250 leagues on each side of the two lines of which we have already taken notice. Agreeable to which idea, we conclude, that in the old continent, the most ancient countries of Africa are those which reach from the Cape of Good Hope to the Red Sea and Egypt, and are about 500 leagues broad; and, of consequence, the whole western coast of Africa, from Guinea to the Straits of Gibraltar, is new land.

In the new continent, we likewise find, that Terra Magellanica, the eastern part of Brasil, the country of the Amazons, of Guiana, and of Canada, are new lands when compared

with Tucuman, Peru, Terra Firma, the islands in the Gulf of Mexico, Florida, the Mississippi, and Mexico.

It was but a small part of the globe with which the ancients were acquainted. All America, the Arctic Circle, Terra Australis the Magellanic, and a great part of the internal regions of Africa, were entirely unknown to them. They knew not that the Torrid Zone was inhabited, although they had navigated the coasts of Africa; for it is 2200 years since Neco king of Egypt gave vessels to the Phœnicians which departed from the Red Sea, doubling the Cape of Good Hope, and having employed two years in this voyage, entered the straits of Gibraltar. The ancients were unacquainted with the properties of the load-stone; they had no idea of the general cause of the flux and reflux of the sea; no certain knowledge that the ocean surrounded the globe without interruption: some indeed suspected it, but with so little foundation, that no one dared to say, that it was possible to make a voyage round the world. Magellan was the first who made it A. D. 1519 in 1124 days. Sir Francis Drake in 1577 did it in 1056 days; afterwards Thomas Cavendish made this great voyage in 777 days, in the year 1586. These famous circumnavigators were the first who demonstrated physically, the globular form and extent of the earth's circumference: which the ancients were far from having a just idea of, although they had travelled a great deal. The general and regulated winds, and the use to be made of them in long voyages, were also unknown to them; therefore, we must not be surprised at the little progress they made in Geography, since at present, in spite of all the knowledge we have acquired by the aid of mathematical sciences, and the discoveries of navigators, many things remain to be found, and vast countries to be discovered.

As there is so large a portion of the globe with which we are unacquainted, particularly near the poles, where the ice has never permitted any navigator to penetrate, we cannot exactly know the proportion between the surface of the earth, and that of the sea; but by inspection and comparison, we are sensible there is more sea than land.

If we would form an idea of the enormous quantity of water which the sea contains, let us suppose one common

and general depth to the ocean; by computing it only at 200 fathoms, or the 10th part of a mile, we shall see, that there is water sufficient to cover the whole globe to the height of 600 feet, which if reduced into one mass, will form a globe of more than 60 miles diameter.

The form of the earth is not that of a globe, but rather what is termed a spheroid, a globe which is flatted at the poles, and the axis, or line which may be supposed to pass through it at the equator, is to its axis at the poles in the proportion of 230 to 229. The solid parts of the earth are formed of beds or strata of different materials, which lie one upon another in a regular order. The first stratum consists of common soil, mixed with a variety of decayed vegetable and animal substances, and with stony and sandy particles. In different parts of the world the other strata are found to consist of different materials, and differently disposed. In some parts the strata are horizontal, in others they are inclined; and veins or fissures of metals, coals, and other minerals, frequently penetrate through the different beds or strata to a great depth, and divide them.

At Marly-la-Ville in France, which is a high country, but flat and fertile; the following strata were found arranged horizontally: from the shells found in No 16, we may conjecture, that at some period the soil of Marly-la-Ville, was the bottom of the sea, which has since been raised to the height of 75 feet.

The state of the various Beds of Earth found at Marly-la-Ville, at the depth of 100 feet.

	Feet	Inch.
I. A free reddish earth, mixed with much mud, a very small quantity of vitrifiable sand and somewhat more calcinable sand	13	: 0
II. A free earth or soil mixed with more gravel, and a little more vitrifiable sand	2	: 6
III. Dirt mixed with vitrifiable sand in a very great quantity, and which made but very little effervescence with aqua fortis	3	: 0
IV. Hard marle, which made a very great effervescence with aqua fortis.	2	: 0
V. Pretty hard marly stone	4	: 0
VI. Marle in powder mixed with vitrifiable sand	5	: 0
VII. Very fine vitrifiable sand	1	: 6
VIII. Marle in earth, mixed with a little vitrifiable sand	3	: 6
IX. Hard Marle, in which was real flint	3	: 6

	Feet	Inch.
X. Gravel, or powdered marle	1	0
XI. Eglantine, a stone of the grain and hardness of marle, and sonorous	1	6
XII. Marly gravel	1	6
XIII. Marble in hard stone, the grain of which was very fine	1	6
XIV. Marle in stone, the grain of which was not so fine	1	6
XV. More grained and thicker marle	2	6
XVI. Very fine vitrifiable sand, mixed with sea fossil shells, which had no adherence with the sand, and the colours of which were perfect.	1	6
XVII. Very small gravel or fine marle powder	2	0
XVIII. Marle in hard stone	3	6
XIX. Very large powdered marle	1	6
XX. Hard and calcinable stone like marle	1	6
XXI. Grey and vitrifiable sand mixed with fossil shells, particularly oysters and muscles, which had no adherence with sand and were not petrified	3	0
XXII. White vitrifiable sand mixed with shells	2	0
XXIII. Sand streaked red and white, vitrifiable and mixed with the like shells	1	0
XXIV. Larger sand, but still vitrifiable, and mixed with the like shells	1	0
XXV. Grey, fine and vitrifiable sand mixed with the like shells	8	6
XXVI. Very fine fat sand, where there were only a few shells	3	0
XXVII. Free-stone	3	0
XXVIII. Vitrifiable sand, streaked red and white	4	0
XXIX. White vitrifiable sand	3	6
XXX. Reddish vitrifiable sand	15	0
Total depth when they left off digging	101	0

Within a trench made at Amsterdam, the earth was dry to the depth of 230 feet, and the strata were found as follow: 7 feet of vegetable or garden earth, 9 of turf, 9 of soft clay, 8 of sand, 4 of earth, 10 of sand, on which it is customary to fix the piles which support the houses of Amsterdam; 2 of argile; 4 of white sand, 5 of dry earth, 1 of soft earth, 14 of gravel, 8 argile, mixed with earth; 4 of gravel, mixed with shells; 103 of clay, and 31 of sand, at which depth they ceased digging.

Every stratum, whether horizontal or inclined, is of an equal thickness throughout. In the quarries near Paris, beds of good stone are scarcely 18 or 20 feet thick; in those of Burgundy they are much thicker. It is the same with marle, the beds of the black and the white, are thicker than those of the coloured; and I know beds of very hard stone, which

the farmers in Burgundy make use of to cover their houses that are not above an inch thick. In short, the thickness of the horizontal strata is so variable, that it is found from one line and less, to 1, 10, 20, 30, or 100 feet thick: the ancient and modern quarries which are horizontally dug; the perpendicular and other divisions of mountains prove, that there are extensive strata in every direction.

The various strata of the earth are not disposed of according to the order of their specific weight; for we often find strata of heavy matter placed on those of lighter. To be assured of this, we have only to examine the nature of the earth on which rocks are placed, and we shall find, that it is generally clay which is specifically lighter than the matter of the rock. In hills and other small elevations, we easily discover the bases on which rocks are founded; but it is not so with large mountains, the summits of which are not only rocks, and these are placed on other rocks; yea, there are mountains upon mountains and rocks upon rocks, to such a considerable height and extent, that we can scarcely be certain whether there is earth at the bottom or not, and of what nature it is. We see picked rocks which are many hundred feet high; these rocks rest on others, &c. nevertheless, may we not compare great with small, since the rocks of little mountains, whose bases are to be seen, rest on earth less heavy and solid than stone, and suppose that the bases of the highest mountains are also of earth?

In a soil where flint is the predominant stone, the country is generally fertile; and if the place is uncultivated, and these stones have been long exposed to the air, without being moved, the upper superficies is always very white, whilst the opposite side which touches the earth, preserves its natural colour. If the blackest, and most flinty flint be exposed to the weather, in less than a year, its surface will change colour, and if we have patience to pursue the experiment, we shall perceive it to lose by degrees its hardness, transparency, and other specific characters, and approach every day nearer and nearer the nature of argile.

What happens to flint, happens to sand; each grain of sand may be considered as a small flint, and each flint as a mass of sand, extremely fine and exactly grained. The example of the first degree of decomposition of sand, is found in the

brilliant and opake powder called *Mica*, in which potters earth and slate are always diffused. The perfectly transparent flints, the *Quartz*, produce by decomposition, fat and soft talc, as petrifiable and ductile as clay: and it appears to me, that talc is a mediate term between glass or transparent flint and argile; whilst on the contrary, coarse and impure flint, by decomposing, passes to potters earth without any intermedium.

Our factitious glass proves also the same alterations: it decomposes in the air, and perishes in some degree by remaining in the earth. At first its superficial scales exfoliate; by working it, we perceive brilliant scales fly from it; but when its decomposition is more advanced, it crumbles between the fingers, and is easily reduced into a very fine, white, talcy powder: art has even imitated nature in the decomposition of glass and flint.

CHAP. II.

OF HILLS---SEAS---RIVERS---LAKES---THEIR NATURE AND PROPERTIES.

IF in place of that beautiful variety of hills and valleys, of verdant forests and refreshing streams, which at present delight our senses, the earth were an even and regular plain; a dreary ocean would cover the whole expanse, and it would be merely the habitation of the scaly race.

It cannot therefore, be supposed, that even at first, the surface of the earth was perfectly regular; and since its formation, a variety of causes, as the motion of the waters, subterraneous fires &c. have contributed much to this irregularity.

Next to the elevations of mountains, we are presented with the irregular depth of the ocean, which is very different even at great distances from land: it is said there is parts above a mile in depth, but these are few. The most general profundities are from 60 to 150 fathoms. Gulfs bordering on the coasts are much shallower, and straits have generally the least depths.

In general, the depths increase or diminish pretty regularly, being for the most part deeper the farther from land. But

there are places in the middle of the sea, as at the *Abrolhos* in the Atlantic, where large shelves appear; and in other places, there are vast sand banks, to which the East Indians are no strangers. Along coasts also the depths are very irregular; yet it may be laid down as a certain rule, that the depth is always proportioned to the height of the coast; the same remark is applicable to rivers.

The highest mountains in Asia are Mount Taurus, Imaus, Caucasus, and the mountains of Japan; all of which are higher than any in Europe. The highest mountains in Africa, *i. e.* the great Atlas, and the mountains of the moon, are at least as high as those in Asia; and the highest of all are in South America, particularly those of Peru, which are more than 3000 fathoms higher than the level of the sea. In general, the mountains between the tropics are loftier than those of the temperate zones, and these more than those of the frigid zones; so that the nearer we approach the equator, the greater are the inequalities of the earth, which with respect to us, are not very considerable when compared with the rest of the globe. Three thousand fathoms difference to 3000 leagues diameter, is one fathom to a league, or one foot to 2300 feet, which on a globe of 2 feet and a half diameter, does not make the 6th part of a line. Hence this earth, which appears to us so crossed and cut by the enormous heights of the mountains, and the frightful depths of the sea, is, when we consider its size, so very slightly furrowed with irregularities, that they can make little or no variation on its natural figure.

Upon the continents the mountains are continued, and form chains. In islands they appear to be more interrupted and isolated, and generally raised above the sea, in form of a cone or pyramid, called *peaks*. The peak of Teneriffe is one of the highest mountains on the earth; being nearly a mile and a half above the level of the sea; the peak of St George in one of the Azores, and the peak of Adam in the island of Ceylon, are also very high. All these peaks are composed of rocks, piled one upon another, and emit from their summits, fire, cinders, bitumen, minerals, and stones. There are even islands which are only the tops of mountains, as St Helena, Ascension, most of the Azores, and Canaries; and we must remark, that in most of the islands,

promontories, and other projecting lands, the middle is always the highest, that they are generally separated by chains of mountains, which divide them in their greatest lengths, as the Grampian mountains in Scotland, which extend from east to west, and divide Great Britain into two parts; it is the same with the islands Sumatra, Lucon, Borneo, Celebes, Cuba, and St Domingo, and also Italy, which is traversed through its whole length by the Apenines.

With respect to depths, those of the ocean are, no doubt; the greatest; but as these can only be discovered by sounding, we shall turn our attention to such as appear on the surface of the earth. The precipices then, which are between rocks, are formed by the sinking of their bases, which sometimes give way more on one side than the other, occasioned by the action of the air and frost, which splits and divides them; or by the impetuous falling of torrents, which open passages, and carry along with them whatever opposes their violence. But these abysses or vast and enormous precipices found at the summits of mountains, to the bottom of which it is not possible sometimes to descend, have been formed by the operation of fire; and consequently the funnels of volcanoes: and all the matter their deficient, had been ejected by the action and explosion of these fires, which have been long extinct, for want of combustible matter. The abyss of mount Ararat, of which M. Tournefort gives a description in his voyage to the Levant, is surrounded with black and burnt rocks, as the abysses of Etna, Vesuvius, and other volcanoes will be, when they have consumed all the combustible matter they contain.

Plot, in his natural history of Staffordshire, mentions a kind of gulf which had been sounded to the depth of 2600 feet, without finding either water or bottom.

Great cavities and deep mines are generally in mountains; they never descend to a level with the plains; so we learn from them the internal structure of the mountain only, and not that of the globe.

It was long thought, that the chains of the highest mountains run from west to east, till the contrary direction was discovered in the new world; but no person before Mr Bourguet discovered the surprising regularity of the structure of those great masses. After having crossed the Alps,

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thirty times in fourteen different parts, twice over the Apennine mountains, and made divers tours in the environs thereof and in mount Jura, he found, that the contours of all mountains bear a striking resemblance to the works of regular fortifications. When the body of a mountain runs from east to west, it forms prominences, which face as much as possible the north and south; this admirable regularity is so striking in valleys, that we seem to walk in a regular covered way; if, for example, we travel in a valley from north to south, we perceive that the mountain which is on the right forms projections or angles which front the east, and those of the mountains on the left front the west, so that in fact, the prominent and concave angles, on each side, correspond with one another alternately. The angles which mountains form in great valleys are less acute, because their direction is not so steep, and they are farther distant from each other; in plains they are not so perceptible as in the courses of rivers, which generally take up their elbows; the middle of them naturally answers to the most striking projections, or the most advanced angles of mountains; and this is the cause of the serpentine courses of rivers. It is astonishing that so obvious a fact should have remained so long unobserved, for when in a valley the inclination of one of the mountains which border it, is less steep than that of the other, the river takes its course nearer the steepest mountain, and does not flow through the middle of the valley.

These observations might be confirmed by a number of facts. The mountains of Switzerland, for instance, are steeper on the south-side than on the north, and on the west than on the east. But the most striking example is afforded by the mountains of Chili and Peru. The Cordeliers are exceedingly steep on the west side, but they have a gradual declivity towards the east, and they end in vast plains, which are terminated by the largest rivers in the world.

This is a consequence of the parallel direction of the different chains of mountains: besides, the whole continent of Europe and Asia is broader from east to west than from north to south; and there are two modes of conceiving this direction. In the long and narrow continent of South America, there is only one principal chain of mountains, that

is, from east to west or from west to east; in fact, it is in this direction all the rivers of America flow, because, excepting the Cordeliers, there are no very extensive chains of mountains, and none the directions of which are parallel to them. In the Old as well as the New Continent, most of the waters have their greatest extent from west to east, and most of the rivers flow in this direction, which is owing to another cause, viz. that there are many long chains of mountains parallel to each other, the directions of which are from west to east, and because the rivers and other streams are obliged to follow the intervals which divide these chains, so one single chain, directed from north to south, will produce rivers, similar to those which issue from many chains of mountains, and it is for this particular reason, that the rivers of America have this direction common with those of Europe, Africa, and Asia.

A remarkable phenomenon has been observed with respect to rivers, which is, that in the inland parts at a distance from the sea, they flow in a direct line; but in proportion as they approach their mouths, they assume more of a winding course. In large rivers, there is a considerable eddy along the banks; and the nearer the sea, this eddy is the greater. The surface of the water in rivers is by no means level from bank to bank; on the contrary, the middle of the stream is higher or lower than the water of the sides according to circumstances. When a river swells suddenly by the melting of snow or any other cause, the middle of the stream is sensibly higher than the sides: in one instance the elevation is said to have been as great as three feet. On the other hand, when rivers approach their mouths, the water near the sides is commonly more elevated than that in the middle.

The inundations occasioned by the Nile, than which nothing can be more natural, have long afforded matter for curious and doubtful speculation. It is the rain which falls in Abyssinia and Ethiopia that occasions the swelling of this river, though the north wind must be regarded as the primitive cause. 1st, Because it drives the clouds which convey the rain from the coast of Abyssinia: 2dly; because by opposing itself to the two mouths of the Nile, it forces the the water back against the stream, and thus prevents it

from [pouring into the sea in too great a quantity : this circumstance may be relied on, for when the wind at the north, suddenly veers to the south, the Nile loses in one day what it gathered in four.

Inundations are generally greatest in the superior parts of rivers ; because the velocity of a river uniformly increases until it empties itself into the ocean. But as the theory of running waters is subject to many difficulties, we ought carefully to study the peculiarities of particular rivers.

The greatest rivers of Europe are, the Wolga, the course of which from Reschow to Astracan on the Caspian Sea, is about 650 leagues ; the Danube, which runs about 450 leagues, from the mountains of Switzerland to the Black Sea ; the Don, from the source of the Sosna, which receives it, to the Black Sea, runs 400 leagues ; the Nieper also falls into the Black Sea, after running 350 leagues ; and the Duine, which empties itself in the White Sea, runs about 300 leagues.

The greatest rivers of Asia are, the Hoanho, which rises at Raja Rilron, and after running 850 leagues, falls into the middle of the gulf of Changi, in the Chinese Sea ; the Jenisca, which runs from Lake Leling to the northern sea of Tartary, a course of about 800 leagues ; the Oby, from Lake Kila to the North Sea beyond Waigat's Straits, runs about 600 leagues ; the Amour, in East Tartary, has a course of 575 leagues, from the head of the river Kerlon, which falls into it, to the sea of Kamschatka. The river Menan may be measured from the source of the Longmu, which falls into it, to its mouth at Poulo-condor ; the Kian, which runs about 550 leagues, from the source of the Kinxa, which it receives till it discharges itself into the Sea of China ; the Ganges, which has a course nearly of the same extent with the Kian ; the Euphrates, computing from the source of the Irma, which it receives, runs about 500 leagues ; the Indus, which runs about 400 leagues, and falls into the Arabian Sea on the east of Guzarat ; and the Sirderoias, which runs about 400 leagues, and falls into Lake Aral.

The greatest rivers of Africa are the Senegal, the course of which, comprehending the Niger, which is but a continuation of it, and the source of the Gambarou, which falls into the Niger, is about 1125 leagues ; the Nile, which rises

in upper Ethiopia, runs about 970 leagues. There are others, the courses of which are but little known, as the Zaira, the Coanza, the Couama, and the Quilmanci.

In America, the river of the Amazons runs above 1200 leagues; the river St Laurence in Canada runs more than 900 leagues; the Mississippi runs above 700 leagues; the Plata extends more than 800 leagues, from its mouth to the source of the Parana, which it receives; the Oronoko runs above 575 leagues, if we reckon from the source of the river Caketa, near Pasto, a part of which falls into the Oronoko, and a part runs towards the river of the Amazons; and the Madera which falls into the Amazons extends above 660 leagues.

In order to ascertain the quantity of water discharged into the sea by all the rivers, we will suppose one half of the surface of the earth to be sea, and the other half dry land; also, that the mean depth of the sea is 230 fathoms. The total surface of the earth is 170,981,012 square miles, and that of the sea 85,490,506, which when multiplied by one-fourth of the depth of the sea, gives 21,372,626 cubic miles for the quantity of water contained in the ocean. Now, that we may pretty nearly ascertain the quantity of water discharged into the sea from the rivers, let us take the river Po, for an example, which runs through Lombardy, and waters a country 380 miles long. According to Riccioli, the breadth of the Po is 100 feet, its depth 10 feet, and it runs at the rate of 4 miles an hour; consequently, the Po discharges into the sea 200,000 cubic perches of water in an hour: and as a cubic mile contains 125 000,000 cubic perches, the Po will require 26 days to discharge into the sea, a cubic mile of water. It only remains to determine the proportion that the Po bears to all the other rivers of the earth taken together, which cannot be done exactly. But, to come as near the truth as possible, let us suppose the quantity of water, which the sea receives from the great rivers in every country, to be proportioned to the extent of the surfaces of those countries; and that the country watered by the Po, and by the rivers that fall into it, is to the total surface of the dry land, as the Po is to all the rivers of the earth. Now, from the most accurate charts, it appears, that the Po waters a country 380 miles long by 120 broad, which make 45,600

square miles. But the surface of the dry land is 85,490,506 square miles; consequently, the quantity of water conveyed to the sea by all the rivers, will be 1874 times greater than the quantity discharged by the Po. But, as 26 rivers, equal to the Po, furnish a cubic mile of water every day, it follows, that in the space of a year, 1874 rivers equal to the Po, will convey to the sea 26,308 cubic miles of water; and that in 812 years, all these rivers would discharge 21,372,626 cubic miles, which is a quantity equal to that contained in the ocean; of course, if the ocean were empty, 812 years would be necessary to fill it from the rivers.

In the Old Continent there are about 430 rivers, which fall directly into the ocean, or into the Mediterranean and Black Seas: and in the New Continent, scarcely 180 rivers are known, which fall directly into the sea. In this number however, I have included none but such as are as large as the river Somme in Picardy. All these rivers carry to the sea a great quantity of mineral and saline particles, which they wash from the different soils through which they pass: hence some naturalists, and among the rest Dr. Halley, have pretended, that the saltiness of the sea proceeds from the salts which the rivers transport thither. Others assert, that this saltiness is as ancient as the sea itself, and that it was thus impregnated to preserve it from corruption. But may we not suppose, that the sea is kept thus pure by the agitations of the wind, and the constant flux and reflux, as much as by the salt it contains; for when it is kept in a barrel, it corrupts in a few days: and Boyle relates, that a mariner becalmed for 13 days, found the sea at the end of that time so putrid, that if the calm had continued, the greatest part of his people on board would have perished. The water of the sea is also mixed with a bituminous oil, which gives it a disagreeable taste, and renders it very unhealthy. The quantity of salt contained in sea water, is about one 40th part, and the sea is nearly equally saline throughout; though there are several parts, as on the Mosambique Coast, where it is much saltier than elsewhere. It is also asserted not to be so saline under the Arctic Circle, which may proceed from the great quantity of snow, and fresh rivers which fall into those seas, and because the evaporations are less there than in warmer climates.

There are rivers which lose themselves in the sands, and others which seem to precipitate themselves into the bowels of the earth: the Guadalquiver in Spain, the river of Gottenburg in Sweden, and the Rhine itself, lose themselves in the earth. It is asserted, that in the west part of St Domingo, there is a mountain of a considerable height, at the foot of which are several large caverns that receive the rivers and brooks, the fall of which is heard seven or eight leagues off. The rivers, however, which disappear thus, are very few; and they seem not to descend very deep. And it is probable, that like the Rhine, they lose themselves by dividing and disappearing through a large surface of sand, of which there are many examples in Africa, Persia, Arabia, &c.

The rivers of the north carry down to the sea prodigious quantities of ice, which form those enormous masses so dangerous to the mariner; those in the sea of Nova Zembla and in the straits of Waigat, come from the Oby, and, perhaps from the Jenisca, and other great rivers in Siberia and Tartary: those of Hudson's Straits, from Ascension Bay, into which many rivers in North America empty themselves; and those of Terra del Fuego, from the southern continent. If fewer of them are found in the northern coasts of Lapland than in those of Siberia and Waigat's Straits, it is because all the Lapland rivers fall into the gulf of Bothnia, and none of them into the North Sea.

The ocean surrounds the whole globe without any interruption, and the tour of the globe may be made by passing the point of South America; but it is not yet known whether the ocean surrounds the northern part of the globe in the like manner: and all mariners who have attempted to sail from Europe to China by the north-east or north-west, have equally miscarried in their enterprises,

The seas which are called Mediterranean, are properly branches from the great ocean, by which they are supplied. Lakes differ from the Mediterranean seas, because they do not receive any water from the ocean; so on the contrary, if they have communication with the seas, they furnish them with water; thus the Black Sea, which some geographers have regarded as connected with the Mediterranean, and consequently as an appendix to the ocean, is only a lake; because, instead of receiving water from the Mediterranean,

it supplies it, and flows with rapidity through the Bosphorus into the lake called the Sea of Marmora, and thence through the straits of the Dardanelles into the Grecian Sea. The water of the Black Sea is less clear and saline than that of the ocean. No island is to be met with in this sea: tempests are very violent here, and more dangerous than those in the ocean; occasioned from the whole body of the water being contained in a kind of bason, which when agitated, has a whirling motion that strikes the vessels on every side with an intolerable violence.

Next to the Black Sea, the greatest lake in the universe is the Caspian Sea, the extent of which, from north to south, is about 300 leagues; and from a moderate computation, is scarcely more than fifty broad. This lake receives the Volga, which is one of the greatest rivers in the world; and also some other considerable rivers, as the Keir, the Fay, and the Gempo; but what is singular, it does not receive any on its eastern side. There are some small islands in the Caspian Sea, the waters of which are less saline than those of the ocean. In this sea no large vessels are used, as the navigation is very dangerous, and because it is shallow, and many banks and shoals are scattered under the surface.

There are lakes, which like pools neither receive nor emit rivers; there are others which do both; and there are some which only receive rivers, as the Caspian Sea and the lake Aral which receive and retain the water of many rivers; and the Dead Sea which receives the Jordan. In Asia Minor, there is a small lake of the same kind, which receives the water of a river the source of which is near Congi, and like the preceding, throws off the water it receives by evaporation. There is one much larger in Persia, on which the town of Marago stands, its figure is oval, and about ten or twelve leagues long, by six or seven broad; it receives the river Tauris, which is not very considerable. There is also a similar small lake in Greece, about 12 or 15 leagues from Lepanto, and there are some of the same sort both in Africa and America.

The largest lakes, however, are those which being the reservoirs of, so they give rise to other great rivers. It is also worthy of remark, that all lakes from which rivers derive their origin; all those which fall into the courses of rivers,

and which carry their water to them, are not saline. But almost all those, on the contrary, which receive rivers, without others issuing from them, are saline; which in some measure favours the opinion we advanced respecting the saltiness of the sea; for evaporation cannot carry off fixed salts, and consequently those, which rivers carry into the sea, remain in it; and although river water appears to taste sweet, we know that it contains a small quantity of salt, and in course of time, the sea must have acquired a considerable degree of saltiness, which still continues to increase. Hence, in my opinion, the Black Sea, the Caspian Sea, the lake Aral, the Dead Sea, &c. are become salt.

The lakes which are any ways remarkable, are, the Dead Sea, the waters of which contain much more bitumen than salt; this bitumen, which is called the *Bitumen of India*, is no other than the Asphaltum, which has induced some authors to denominate this sea, *lake Asphaltum*. The land which borders on this lake contains a great quantity of bitumen, and many have applied the fables to this lake, which the poets feigned of the lake Avernus, that no fish could live in it, and that birds which attempted to fly over it were suffocated. But neither of these lakes produce such mortal events; fish live in both, birds pass over them, and men bathe in them without the least danger. A petrifying lake in Iceland, is also mentioned, and the lake Neagh in Ireland, has also the same property of apparently turning wood, &c. into stone; but these petrifications are no other than incrustations like those made by the water of Arcueil.

CHAP III.

OF TIDES---WINDS, REGULAR AND IRREGULAR---MONSOONS---
HURRICANES---WHIRLWINDS---WATER-SPOUTS.

WATER, like every other fluid, remains smooth and tranquil, unless put in motion by some foreign cause. All the waters of the ocean are collected in the lowest places upon the surface of the earth; hence the motion of the sea must proceed from external causes. The chief motion is that of the

tides, which rise and fall alternately, and produce a perpetual motion from east to west. These two motions have an unvariable relation to the motions of the moon. During the full and new moons, this motion from east to west is most observable, as well as that of the tides, which ebb and flow upon most coasts, every $6\frac{1}{2}$ hours. It is always high tide when the moon arrives at the meridian; and low tide, when she is at the greatest distance from it, viz. at rising and setting. The motion from east to west is perpetual; because when the tide rises, it pushes an immense body of water from east to west, and the ebbing seems only to be occasioned by a smaller quantity of water which is impelled westward.

This motion is attended with the following circumstances: 1st, It is more apparent at the full and new moon than at the quadratures. It is also more violent in spring and autumn than any other season; and weakest at the solstices. This is owing to the combined attraction of the sun and moon. 2d, The direction and quantity of this motion is often varied by the winds, particularly by those which blow incessantly from the same quarter. 3d, It is worthy of remark, that when one part of a fluid is moved, the motion is communicated to the whole; so that the ocean is in a constant state of agitation.

In order to throw a little more light upon this subject, let us attend to the causes which produce the tides. We may therefore remark, that the moon acts upon the earth by a power called gravity or attraction. This power penetrates the whole globe, and is exactly proportioned to the quantity of matter, and decreases as the squares of the distances increase. Let us now examine what effects this power must produce upon the waters when the moon comes to the meridian of any place. The surface of the water immediately under the moon, is nearer that planet than any other part of the earth, consequently, that part of the sea must be elevated towards the moon, and the summit of this eminence must be opposite to the moon's centre. To produce this eminence, the waters upon the surface, as well as those at the bottom, contribute their share, in proportion to their distances from the moon, which acts upon them in the inverse ratio of the squares of their distances. Hence the sur-

face of this part of the sea is first elevated; the surface of the adjacent parts is also elevated, but not so much; and the waters at the bottom of all these parts are raised by the same cause. Thus, as the whole portion of water under the moon is raised, the water at a distance, upon which no attraction is exerted, must necessarily rush forwards with precipitation, to supply the place of that which was drawn towards the moon. It is in this manner that the tides are produced, which is more or less perceivable in different coasts, and which agitates the sea not only at the surface, but throughout its whole profundity. The ebb, is a consequence of the natural disposition of the water, when no longer acted upon by the moon, to subside, and returns to occupy those shores from which it had been forced to retire by an external cause.

Nothing is more irregular in our climates than the course of the winds; but there are countries where this irregularity does not exist, and others where the wind blows constantly in the same direction.

There are several causes which give rise to the motion of the air, but the most powerful is the sun, which by rarefying it, produces an influx of cold air, which is a heavier fluid, and consequently presses in upon that which is rarefied and light, and produces a stream or current, called wind. In the Torrid Zone, this effect is more uniformly manifest than in other parts of the world. In the regions near the equinoctial, a continual rarefaction is produced by the sun, and a constant current of air follows that luminary in his progress from east to west. This easterly wind blows so generally in the Pacific Ocean, that ships which sail from Acapulca to the Philippines, perform a voyage of 2700 leagues in less than two months.

About 28 or 30 degrees on this side of the line, the west winds are equally constant, and it is for this reason, that vessels returning from the West Indies to Europe do not pursue the same route as in going out.

The winds which blow continually for some months, are generally followed by contrary winds, and mariners are often obliged to wait for that which is most favourable; when

these winds change, a calm or dangerous tempest ensues, which lasts for several days, and sometimes for a month.

These general winds, occasioned by the rarefaction of the atmosphere, combine differently by different causes in different climates. In part of the Atlantic Ocean under the Temperate Zone, the north wind blows almost constantly during the months of October, November, December, and January; which is the reason why these months are the most favourable to embark from Europe to India, in order to pass the line by the favour of these winds: and it is known, that ships which quit Europe in the month of March, do not arrive sooner at Brazil than those which sail in the month of October. The north wind almost continually reigns during winter in Nova Zembla, and the other northern coasts. The south wind blows during the month of July at Cape Verd, when the rainy season, or winter of these climates sets in: at the Cape of Good Hope, the north west wind blows during the month of September: at Patna, in India, it blows during the months of November, December, and January, and produces heavy rains; but the east wind blows during the other nine months.

In the kingdom of Guzarat, and on the coasts of the neighbouring sea, the north winds blow from March till September; and during the other months of the year, south winds almost always prevail. The Dutch, in order to return from Java, generally set sail in the month of January or February by an easterly wind, which is felt as far as 18 degrees north latitude, after which they meet with south winds which carry them to St Helena.

In the Mediterranean, the wind blows from the land towards the sea at the sun's setting; and, on the contrary, from the sea towards the land at his rising. Hence, in the morning it is an easterly wind, and in the evening a westerly wind. The south wind, which is rainy, and which generally blows at Paris, Burgundy, and Champagne, at the beginning of November, and which gives place to mild and temperate breezes, produces the fair weather, vulgarly called, the summer of St Martin.

On the sea, the winds are more regular than at land, because the temperature of the sea is more equal. The temperature at the land is altered by a variety of causes; such

as electricity, volcanoes, exhalations from the earth, the explosions of meteors, &c.

In general, on the sea, the east wind and those which come from the poles, are stronger than the west and those which proceed from the equator. On the land, on the contrary, the west and south winds are more or less violent than the east and north winds, according to the situation of the climates.

Contrary currents are often observed in the air; clouds that move in one direction, and others which are higher or lower than the first, proceed in a direction entirely opposite. This contrariety of motion, however, does not remain very long, and it is commonly produced by the resistance of some clouds to the action of the wind, and by the reaction of the direct wind, which reigns solely as soon as the obstacle is removed.

Winds are more violent in mountainous places than in plains; and the higher we ascend, the more the power of the wind increases, until we reach the common height of the clouds, which is about one-quarter or one-third of a league. Beyond that height, the sky is generally serene, especially in summer, and the wind is said to be even imperceptible on the tops of the highest mountains.

A current of air increases in velocity, like a current of water, where the space of its passage is contracted. The wind, which is but slightly felt in a wide and open plain, becomes violent in passing through a narrow passage between two mountains, or between two lofty buildings; and the point of the most violent action of the wind is above the structures or mountain straits. For the air being compressed by the resistance of these obstacles, has a greater mass, density, and velocity subsisting; the effort or gust of wind, and the *momentum* become much stronger; this is the cause that near a church or a castle, the winds seem to be much stronger than they are at a certain distance from these edifices. I have often remarked, that the wind reverberated from a building that stands by itself, is stronger than the direct wind that produced it. And since I have endeavoured to discover the reason of this, I have been able to find no other than the above. The impelled air compresses against the building, and is beat back, not only with its former velocity, but

also with a greater body, which, in fact, renders its action much more violent.

Particular winds, whether direct or reflected, are more violent than those which are general. An uniformly continued stream of air, produces not such havock, as the fury of those winds which blow in sudden gusts. The predominancy of certain winds, in certain parts, has occasioned a general division of them into zones, though it is not to be understood that their effects are invariable. The east wind, which extends 20 or 30 degrees on each side of the equator, occupies the Torrid Zone, and the north wind the Frigid Zones. With regard to the Temperate Zones, the winds which reign there, are, if I may use the expression, only currents of air, the motion of which is composed of those two winds, the direction of which tends to the west. And with respect to the westerly winds, the direction of which tends to the east, and which often prevail in the Temperate Zone, whether in the Pacific or Atlantic Oceans, they may be considered as winds reflected by the continents of Asia and America, but originally proceeding from the east and north winds.

The monsoons, or trade winds, which have an alternate motion, are subject to many deviations. Some continue for a longer, some for a shorter time; and they also differ in their extent, and in their degree of violence. In the Indian Ocean, for instance, between Africa and India, as far as the Moluccas, the east wind begins in January, and lasts till June. In the month of August or September, the contrary motion begins; and the west winds reign during three or four months. In the intervals of these monsoons, that is, at the end of June, in the month of July, and beginning of August, there is no wind on that sea; but it is infested with violent storms from the north.

There are winds which may be regarded as peculiar to certain coasts; for example, the south wind is almost continual on the coasts of Chili and Peru. It begins about the 46th degree of south latitude, and extends beyond Panama, which renders the voyage from Lima to Panama much easier than the return. The westerly winds blow almost continually, or at least very frequently, on the Magellanic coasts, and over the environs of the straits of Maire. The north

and north-west winds prevail almost continually on the Malabar coast; the north-west wind is also very frequent on the coast of Guinea; and at a certain distance from that coast, in the open sea, we meet with the north-east wind very frequently. The westerly winds reign on the coasts of Japan, in the months of November and December.

The alternate or periodical winds, which we have just been speaking of, are sea winds. But there are also land winds, which are periodical, and return either at a certain season, or in certain days, or even at certain hours. On the Malabar coast, for example, from the month of September to April, a land wind blows from the eastern side: it generally commences at midnight and finishes at noon, and is not felt beyond 12 or 15 leagues from the coast, and from noon till midnight a weak sea wind reigns, which comes from the west. On the coast of New Spain in America, and on that of Congo in Africa, land winds reign during the night, and sea winds during the day. At Jamaica, the winds blow from all quarters at once, during the night, which hinder vessels from either landing or setting out but in the day time.

The winds are however more irregular on the land than on the sea, and more irregular in the higher lands than in plains. The mountains not only alter the direction of winds, but they even produce winds, which are either constant or variable according to different causes. The melting of the snow, which is upon the mountains, generally produces constant winds, which sometimes remain very long. The vapours which are stopt by mountains, and which accumulate upon them, produce variable winds, very frequent in all climates. In the straits, on all the projecting coasts, at the extremity and in the environs of all promontories, peninsulas and capes, and in all narrow gulfs, storms are frequent. But independent of these circumstances, some seas are much more tempestuous than others. The Indian Ocean, the Japan Sea, the Magellanic Sea, that of the African coast beyond the Canaries, and on the other side towards the country of Natolia, the Red Sea, &c. are very subject to storms. The Atlantic Ocean is more stormy than the Ocean, which, from its tranquillity, is called the *Pacific*. This ocean, however, is not absolutely tranquil,

except between the tropics, and about the Temperate Zones; and the more we approach the poles, the more we are subject to variable winds, the sudden changes of which often occasion tempests.

All continents are subject to variable winds, which often produce singular effects. In the kingdom of Cassimir, which is surrounded by the mountains of Caucasus, a very sudden reverse of season is felt on mount Pirepenjale: for in less than an hour's journey we pass from summer to winter. A north and a south wind, according to Berner, blow perceptibly within 200 paces of one another. In the peninsula of India, which is traversed from north to south by the mountains of Gate, the extreme heats of summer are felt on one side of the mountains, and all the rigour of winter on the other. The same phenomenon is also observed at Cape Rozalgate in Arabia, and the island of Ceylon.

In Egypt, during summer, a south wind prevails, which is so hot as to stop respiration; and it raises so great a quantity of sand, that the sky seems covered with thick clouds. This sand is so fine, and driven with such force, that it penetrates every where, even into the closest coffers. When these winds last several days, they occasion epidemical diseases, which are often attended with the most fatal consequences.

The Cape of Good Hope is famous for its tempests, and the singular cloud which produces them. This cloud appears at first only like a small round spot in the heavens, called by sailors *the Ox's Eye*, and which I imagine appears so small from its exceeding great height. In Natolia, a cloud similar to the Ox's eye at the Cape, produces the same direful effects. In the sea between Africa and America, especially under the equator and in the neighbouring parts of it, these tempests very often arise; near the coast of Guinea, sometimes three or four of these storms are formed in a day. They are occasioned and announced, like those of the Cape, by small black clouds. The rest of the sky is generally very serene, and the sea calm. The first blast which issues from these clouds is furious, and would sink ships in the open sea, if they did not take the precaution to furl the sails. It is principally in the months of April, May, and June, that

these tempests are experienced on the Guinea Sea, because no regular wind blows there during the season.

All these tempests originate from winds which issue from a cloud, the direction of which is either to the north or south, north east or south west, &c. But there are tempests called *hurricanes*, which are still more violent, and in which the winds seem to blow from all the coasts at once, with a circular motion, which nothing can resist. A calm generally precedes these horrible tempests; but in an instant the fury of the winds raises waves as high as the clouds. Some parts of the sea cannot be approached, because they are continually infested with calms or whirlwinds. The Spaniards have therefore called these places *calms and tarnados*.

When from a sudden rarefaction, or any other cause, contrary currents of air meet in the same spot, a whirlwind is produced. Perhaps the same effect takes place in another element, and gulfs or whirlpools, may be no other than the eddies of the water formed by the action of two or more opposite currents. The Euripus, so famous for the death of Aristotle, alternately absorbs and rejects the water seven times in twenty four hours: this gulf is near the Grecian coast. The Charybdis, which is near the strait of Sicily, rejects and absorbs the water thrice in twenty-four hours. We are uncertain, however, with respect to the number of alternate motions in other whirlpools. The greatest known gulf is that of the Norway Sea, which is affirmed to be upwards of twenty leagues in circuit. It absorbs for six hours, water, whales, ships, and whatever is near it, and afterwards returns them.

A waterspout is no other than a whirlwind at sea. The vacuum which is occasioned by the meeting currents, makes the water rise in the form of a cylinder, or rather of an inverted cone. In the travels of Mr Thevenot, there is a very minute and circumstantial account of the formation of a waterspout; though there is reason to suspect, that the relation is not without some optical deceptions.

The first, says this celebrated voyager, that we saw, was on the northern coast, between us and the island Quesomo, about a gun-shot from the ship. We directly perceived the water begin to boil on the surface of the sea, about a foot high; it was whitish, and appeared above that height like a

thick black smoke, so that it properly resembled some burning straw, which only smoked. It made a noise like that of a torrent which runs with much rapidity in a deep valley. But this noise was mixed with another, similar to the strong hissing of serpents or vipers. A little while afterwards, we perceived something like a dark canal or pipe, which bore a strong resemblance to smoke, ascend towards the clouds, which revolved with great velocity. This pipe appeared to be about the thickness of my finger, and the same noise continued; the duration of this spout was about a quarter of an hour. We then perceived another on the south side of us, which began in the same manner as the preceding. Immediately a third and then a fourth sprung up, both to the west; which appeared like heaps of smoking straw, and were accompanied with the same noise as the first. We afterwards saw three pipes or canals, which descended from the clouds, on those places where the water was raised up, each of which was as broad at the end fastened to the cloud, as the broad end of a trumpet, and resembled the teat of an animal, drawn perpendicularly down by a heavy weight. These canals appeared of a darkish white, and were crooked in some places; and their directions from the clouds to which they were joined to the parts which drew in the water, were very oblique. And what is singular, the cloud which the second of these three was fastened to, having been driven by the wind, the canal followed it without breaking or quitting the place where it drew in the water; and passing behind the first canal, they sometimes appeared like St Andrew's Cross. At the beginning, they were all about the thickness of my finger; but afterwards, the first of the three increased considerably: and the last which was formed, scarcely remained longer than that which we saw on the north side. The second, on the south side, remained about a quarter of an hour, but the first on that side remained a little longer; and it was this which terrified us the most. At first, its canal was as thick as my finger, afterwards as thick as my arm, then as my leg, and at last as the trunk of a large tree, which a man might compass with his arms. We distinctly perceived water through this transparent body, which ascended in a serpentine form. Sometimes it diminished a little in size, sometimes at top and sometimes at

bottom; then it exactly resembled a soft tube with some fluid matter pressed with the fingers, either at top, to make the liquor descend, or at bottom, to make it ascend. After this, it diminished so much, that it was no thicker than my arm; then it became as thick as my thigh, and again became very small. At last, I saw that the elevated water began to lower, and that the end of the canal, which touched it, divided and grew narrower, when a variation of the light removed it from our view.

CHAP IV.

OF VOLCANOES—EARTHQUAKES—THE FORMATION OF NEW ISLANDS—CAVERNS AND GROTTOS—BOGS AND FENS—CHANGES OF LAND INTO SEA, &c.

BURNING mountains, called Volcanoes, contain in their bowels, sulphur, bitumen, and other materials, which serve as aliment to a subterraneous fire; the effect of which, is more violent than that of gunpowder or even of thunder. A volcano, is a cannon of a very large size, the orifice of which is often more than half a league; and vomits forth torrents of smoke, flame, rivers of bitumen, sulphur, and melted metal, clouds of cinders and stones, and sometimes it ejects enormous rocks to the distance of many leagues. The combustion is so terrible, and the quantity of burnt, melted, calcined, and vitrified materials, which the mountain throws out, so plentiful, that it enters cities, forests, covers the fields an hundred, and sometimes two hundred feet thick, and frequently forms hills and mountains. The action of this fire is so great, and the force of the explosion so violent, that its reaction has been known to shake the earth, agitate the sea, overthrow mountains, and destroy the most solid towns and edifices, to a very considerable distance. The natives of Iceland, imagine, that the roarings of the

volcano are the cries of the damned, and its eruptions, the effects of the rage and despair of these unhappy wretches.

All these phenomena, however, are only the effects of fire and smoke. In the bowels of mountains, there are veins of sulphur, bitumen, and other inflammable substances; also great quantities of pyrites, which ferment when exposed to the air, or to moisture, and produce explosions in proportion to the quantity of inflammable matter they contain. A mixture of sulphur, filings of iron, and water, buried at a certain depth in the ground, will exhibit, in miniature, all the appearances of a volcano. This mixture, will soon produce explosions, perfectly similar to those of burning mountains.

There are three famous volcanoes in Europe, *Ætna* in Sicily, *Hecla* in Iceland, and mount *Vesuvius*, near Naples in Italy. Mount *Ætna* has burnt from time immemorial: its eruptions are very violent, and the matter it throws out, so plentiful, that it may be dug to the depth of 68 feet; where we meet with marble pavement, and the vestiges of an ancient town, which has been buried under matter ejected from this mount, in the same manner, as the city of *Herculaneum* has been covered by the matter thrown out of *Vesuvius*. New mouths of fire were formed in 1650, 1669, and at other times. We can see the flame and smoke of this volcano from Malta, which is about 60 leagues distant; it smokes continually, and sometimes vomits flame and matter of every kind with impetuosity. In 1537, there was an eruption of this volcano, which occasioned an earthquake in Sicily, for 12 days; and overthrew a great number of houses and other structures. It ceased only by the opening of a new mouth, which burnt every thing within five miles of the mountain. The cinders thrown out by the volcano, were so abundant, and ejected with so much force, that they were driven as far as Italy; and vessels which had departed to some distance from Sicily, were incommoded by them. *Farelli*, describes the conflagration of this mountain circumstantially; and says, the foot of it is 100 leagues in circumference.

This volcano, has now two principal mouths, the one narrower than the other, which always smoke; but fire is never seen to issue from them, but during the time of erup-

tions. It is pretended, that stones are found which it has thrown out to the distance of 60,000 feet.

One of the last, and most violent eruptions of mount Vesuvius, was in the year 1737. The mountain vomited, by divers mouths, large torrents of burning metallic matter, which overflowed the country, and run into the sea. Mons. de Montealegre, who communicated this relation to the Academy of Sciences, observed, with horror, one of these rivers of fire, and saw its course for six or seven miles, till it reached the sea. Its breadth was sixty or seventy feet, its depth twenty five or thirty palms, and in certain bottoms or valleys, 220: the matter was like the scum which issues from the furnace of a forge.

In Asia, as well as in America, there are a great number of volcanoes; but there is nothing worthy of remark in any, except the violence with which some of them emit the burning matter they contain.

Near Fez, in Africa, there is a mountain or rather a cavern, called *Beniguazevel*, which always emits smoke, and sometimes flames. One of the islands of Cape Verd, called the island of *Fuogo*, is only a large mountain which burns incessantly. This volcano, like the rest, throws out many cinders and stones; and the Portuguese who have attempted several times to erect habitations on it, have been constrained to abandon the project, through the dread of its effects. The Canaries, the Peak of Teneriff, and some of the highest mountains in the world, throw out fire, cinders, and large stones; from the tops of which, rivulets of melted sulphur flow, which are discernible at a great distance.

The matter which volcanoes throw out, generally comes forth in the form of torrents of melted minerals, which inundate the environs of these mountains; and when cooled, form horizontal or inclined strata, which, for position, are like the strata formed by the sediments left by floods. But it is very easy to distinguish the strata produced by the expansion of matter thrown out by volcanoes, from those which have the sediment of the sea for their origin. 1. Because those strata are not of an equal thickness: 2. Because they contain only matter which is easily perceived to have been calcined, vitrified, or melted, and because they do not extend to any great distance. When coal mines are opened,

which are generally met with in argillaceous earth, at a great depth; it sometimes happens, that such matter has taken fire. There are even mines of coal in Scotland, Flanders &c. which have burnt for a number of years. The communication of the air suffices to produce this effect; but the fires which are lighted in these mines, produce only slight explosions, and do not form volcanoes; because, all being solid and full in these places, fire cannot be excited like that of volcanoes, in which there are cavities and void places where the air penetrates, which must necessarily extend the conflagration and augment the action of the fire to the point in which we see it, when it produces the terrible effects we have taken notice of.

There are two kinds of earthquake; the one occasioned by the action of subterraneous fires, and the explosion of volcanoes which are only felt at small distances, and at the time when volcanoes act, or before they open. When the matter which forms subterraneous fires, ferments, heats, and inflames; the fire makes an effort on every side, and if it does not find a natural vent, it raises the earth, and forces a passage for itself by throwing it out, which produces a volcano, the effects of which are repeated, and last in proportion to the quantity of inflammable matter. If the quantity of matter which takes fire, is not considerable, a commotion or an earthquake may issue, without a volcano being formed. The air produced and rarefied by subterraneous fire, may also find small vents, by which it will escape, and in this case, there will be only a shock, without an eruption or volcano. But when the quantity of inflamed matter is great, and confined by solid and compressed matter, then a commotion and volcano arises; but all these commotions form only the first kind of earthquake, and can only shake a small space of ground. A very violent eruption of mount *Ætna*, will occasion, for example, an earthquake through the whole island of Sicily; but it will never extend to the distance of three or four hundred leagues. When any new mouths are formed in mount *Vesuvius*, there are earthquakes at Naples, and in the neighbourhood of the volcano: but these earthquakes never shake the Alps, and are not communicated to France, or to other countries remote from the source of the phenomenon.

But, there is another kind of earthquake, very different in its effects, and perhaps in its cause. There are also earthquakes which are felt at great distances, and which shake a great extent of ground, without any new volcano or eruption appearing.

To understand rightly, what may be the cause of this kind of earthquake, it must be remembered, that all inflammable matter capable of explosion, produces like gun-powder, by inflammation, a great quantity of air; that this air is in a state of very great rarefaction; and that, by a state of compression, in which it is found in the bowels of the earth, it must produce very violent effects. Let us therefore suppose, that, at a very considerable depth, as at one or two hundred fathoms, pyrites, and other sulphurous matter are to be met with; and that, by the fermentation produced by the filtration of water, or other causes, they inflame. At first, this matter is not disposed regularly by horizontal strata, as the more ancient matter is, which has been formed by the sediments of the waters. On the contrary, they are formed in perpendicular strata, in caverns at the feet of these clefts, and in other parts where the water can act and penetrate. This matter inflaming, will produce a great quantity of air or vapour, the spring of which, compressed in a small space, like that of a cavern, will not shake the earth immediately above, but will search for passages, in order to make its escape. It will, therefore, naturally force its way through those parts, where it meets with the least obstruction, and will proceed through the interstices between the different strata, or any channel or cavern through which it can find a passage. This subterraneous air or vapour, will, in its passage, produce a noise and motion proportioned to its force, and to the resistance it meets with. And these effects will continue, till it finds a vent, perhaps in the sea, or till it has diminished its force by being greatly expanded. This explanation, corresponds entirely with the phenomena which are observed respecting earthquakes. They proceed with a wave-like motion, and are felt at different places, not at the same instant, but at different times, in proportion to the distance.

We can also confirm what has been advanced, by connecting it with two other circumstances. It is well known, that

mines exhale vapours, which are produced by currents of water, independent of the wind; we often meet with currents of unhealthy air and suffocating vapours. We also know, that there are holes, abysses, and deep lakes in the earth, which produce winds; as the lake Boleslaw in Bohemia, &c.

From history, we have innumerable instances, of the dreadful and various effects of these terrible phenomena. Pliny, in his first book, chap. 84, relates, that in the reign of Tiberius, an earthquake happened, which overthrew twelve towns in Asia; and in his second book, he mentions an earthquake, which overthrew 100 towns in Lybia. In the time of Trajan, the town of Antiochus, and a great part of the adjacent country, were swallowed up by an earthquake; and, in the time of Justinian, in 528, it was again destroyed by a second, with upwards of 40,000 of its inhabitants. And, sixty years after, in the time of Saint Gregory, it felt the effects of a third earthquake, with the loss of 60,000 of its inhabitants. In the time of Saladin, in 1182, most of the towns of Syria and Jerusalem were destroyed by the same cause. In Calabria and Poh, there have been more of them than in any other part of Europe. In the time of Pope Pius XI. all the churches and palaces of Naples were overthrown, and above 30,000 of its inhabitants killed. In 1629, there were earthquakes in Pola, which destroyed 7000 persons; and in 1638, the town of Saint Euphemia was swallowed up; and there remains only a stinking lake in its place. Ragusa, and Smyrna, were also nearly destroyed. There was an earthquake in 1692, which extended into England, Holland, Flanders, Germany, and France; it was chiefly felt on the sea coasts, and rivers, and extended to a space of at least 2600 leagues square. On the 16th of June, 1628, there was so horrible an earthquake in the island of St Michael, that the sea near it opened, and, in one place, where it was more than 150 fathoms deep, threw up an island a league and a half long, and upwards of 60 fathoms high.

Another earthquake happened in 1691, which began the 16th of July, and lasted in the island of St Michael till the 12th of the following month. Tercera, and Fayal, were agitated the next morning with so much violence, that they

appeared to move; but these frightful shocks returned only four times; whereas, at St Michael's, they did not cease a moment for 15 hours. The islanders having quitted their houses, which they saw fall before their eyes, passed all that time exposed to the injuries of the weather. A whole town, named Villa Franca, was overthrown to its very foundation, and most of the inhabitants buried under its ruins. Several plains rose into hills, and some mountains sunk into valleys. A spring of water issued from the earth, which flowed for four hours, and then suddenly became dry. The air and sea, still more agitated, resounded with a noise like the roaring of a number of wild beasts. Many persons died with the fright, the ships in the ports suffered dangerous shocks; and those which were at anchor or under sail, 20 leagues distant from the islands, sustained great damage.

In the year 1646, the mountain of the island of Machian, split with terrible reports, by an earthquake; and so many fires issued through this opening, that they consumed many negro-yards, and all that were in them. This prodigious crack is still apparent; and is called the path of Machian, because it descends from the bottom like a road hollowed out; but which, at a distance, appears like a path.

At sea, the shock of an earthquake is felt at a considerable distance. M. Shaw, relates, that, in 1721, being on board the *Gazelle*, an Algerine vessel, mounting 50 guns, three violent shocks were felt one after another, as if a weight of 20 or 30 tons had each time been thrown on the ship. This happened in a part of the Mediterranean which was 200 fathoms deep.

In countries subject to earthquakes, it happens, when a new volcano is formed, earthquakes cease, and are only felt in the violent eruptions of the volcano, as is observed in the island of St Christopher.

New islands are produced, either suddenly, by the operation of subterraneous fires, or slowly, by the accumulated sediments of water. Seneca, informs us, that in his time, the island Therasia suddenly emerged from the sea; and Pliny relates, that thirteen islands arose all at once from the bottom of the Mediterranean. Upon this subject, however, we have some facts more recent, and less involved in obscurity.

The 23d of May, 1707, at sun-rising, near the same island of Therasia, or Santorini, something was seen like a floating rock in the sea. Some persons, excited by curiosity, approached it, and found this shoal which had issued from the bottom of the sea, to increase under their feet; and they brought with them pumice stone and oysters, which still adhered to its surface. There was a slight earthquake at Santorini, two days before the growth of this shoal; which increased considerably till the 14th of June, without any accident, and was then half a mile round, and from twenty to thirty feet high. The earth was white, and bordered a little on argillaceous, after which, the sea was still more agitated; vapours arose, which affected the island Santorini; and the 16th, 17th, or 18th of July, rocks were seen to issue at one time from the bottom of the sea; which seemed to unite into one. All this was done with a dismal noise, which continued upwards of two months, during which time, the island still kept increasing in circumference and height; and the explosions threw out rocks and stones to the distance of seven miles.

The 10th of October, 1720, near the island Tercera, a very considerable fire rose out of the sea. Mariners having been sent to examine it, they perceived an island the 19th of the same month, which appeared to be covered with fire and smoke, and a prodigious quantity of cinders, as if thrown from a volcano, and accompanied with a noise similar to that of thunder.

The Historian of the French Academy, in relating this event, remarks, that after an earthquake in the island of St Michael, a torrent of fire appeared between it and the island Tercera, which gave birth to two new rocks; and, the next year, the same Historian give the following account:

“ M. de l’Isle, has informed the Academy of several particulars, which were communicated to him in a letter, from “ M. de Montagnac, consul at Lisbon, concerning the new “ island among the Azores. On the 18th of September, “ 1721, M. de Montagnac’s vessel was moored off the For- “ tress of St Michael; and he procured from the Pilot of the “ port the following intelligence.

“ On the 7th of December, 1720, at night, a great earth- “ quake happened in Tercera and St Michael, which are dis-

“ tant about 28 leagues from one another, and a new island
“ emerged from the sea. It was, at the same time observed,
“ that the island Peak, thirty leagues distant, which ejected
“ flames, was extinct; and that a continual thick smoke
“ proceeded from the new island, which was distinctly per-
“ ceived by M. de Montagnac, as long as he remained in that
“ part. The pilot assured him, that he had sailed round the
“ island, and approached it as near as he could with safety.
“ He sounded, on the south side of it, with a rope of 60 fa-
“ thoms; but found no bottom. On the west side, the wa-
“ ter appeared to be mixed with white, blue, and green;
“ and at the distance of two miles, it seemed to be shallow,
“ and boiling. On the north-west, the side from which the
“ smoke issued, he found, at 15 fathoms, a bottom of coarse
“ sand. He threw a stone into the sea, and at the place
“ where it fell, he observed the water boil and mount into
“ the air with great velocity; and the bottom was so hot, as
“ to melt a piece of suet that had been fastened to the end
“ of the plumb line. The pilot, also, observed smoke to is-
“ sue from a small lake in the midst of a sandy plain.

“ We have since learned, from M. Adrien, the French con-
“ sul at St Michael, dated March, 1722, that the new island
“ is nearly on a level with the water; and that it will proba-
“ bly soon disappear.

“ From these, and several other facts, it appears, that in-
“ flammable bodies exist under the sea, and that they some-
“ times produce violent explosions.”

On the whole, islands produced by the action of fire,
and earthquakes, are but few, and these events are seldom;
but there are an infinite number of new islands produced
by the mud, sand, and earth, which rivers, or the sea,
transport into different places. At the mouths of most
rivers, masses of earth, and banks of sand are formed; the
extent of which often become considerable enough to form
islands of a moderate size. It may also be remarked, that
there are very few islands in the middle of the sea, compar-
ed with those in the neighbourhood of continents, where the
sea formed them, either by retreating from, or approaching
towards these countries.

Water and fire, the natures of which are opposite ; produce, what at least appears to us, similar effects. Water, as has been observed, has produced mountains, and formed islands. There are likewise caverns, clefts, holes, gulfs, &c. some of which owe their origin to subterranean fires, and others to water.

Saint Patrick's cavern, in Ireland, is not so considerable as it is famous. It is the same with the Dog's Grotto in Italy, and with that which throws out fire in the mountain of Benigauzeval, in the kingdom of Fez.

One of the most remarkable and largest caverns, is that of Antiparos, which is computed to be three hundred fathoms deep ; and the grotto appears to be forty fathoms high by fifty broad. It is filled with large, and beautiful stalactites, of various forms, both on the roof and at the bottom.

In that part of Greece, called Livadia, (the Achaia of the ancients) there is a large cavern, in a mountain which was formerly very famous for the oracles of Trophonius, between the lake Livadia and the adjacent sea. There are forty subterranean passages across the rock, under a lofty mountain, through which the waters of the lake continually flow.

In the month of June, 1714, a part of the mountain of Diableret in Valois, fell suddenly, between two and three o'clock in the afternoon. The sky was very serene ; the mountain was of a conical figure, and destroyed fifty-three huts belonging to the boors, crushed to death fifteen people, above two hundred cattle, and covered a square league with its ruins. A profound darkness was occasioned by the dust. The heaps of stones thrown together stopped the currents of water, which formed new and very deep lakes. In all of which, there was not the least trace of bituminous matter, sulphur, nor lime ; and consequently no subterranean fire : for it appeared, that the base of this great rock was entirely reduced to dust by the corroding teeth of time.

We have a remarkable example of these sinkings near Folkstone, in the county of Kent. The hills in its environs, which are composed of rocks of stone and chalk, have sunk imperceptibly and without any earthquake ; and by so doing, have thrown into the sea great rocks and vast quantities of earth.

When the water on the surface of the earth cannot find vent, it forms morasses and bogs. The most famous morasses in Europe, are those of Moscovy, at the source of Tanais; those of Finland, where are the great morasses of Savolax and Enasak. There are also some in Holland, Westphalia, and many other low countries. In Asia, there are the morasses of the Euphrates, those of Tartary, and the Palus Meotidis: but in general, there are fewer in Asia, and Africa, than in Europe. America, may be said to be one continued morass through all its plains; which is a proof of the modern date of the country, the small number of inhabitants, and also of their want of industry.

To give an idea of the quantity of earth, which the rains carry from the mountains into the valleys, we can quote a circumstance related by Dr Plot; who in his Natural History of Staffordshire, observes, that in his time, at the depth of eighteen feet, several pieces of money, coined in the reign of Edward V. had been found; which was a period of two hundred years. Hence this ground, which is boggy, had increased above a foot in eleven years, or an inch and a twelfth every year. We can make a similar observation on trees buried at the depth of seventeen feet, below which, medals of Julius Cæsar have been found: hence, the earth brought from mountains into plains by currents of water, must considerably increase their elevations.

In the city of Modena, and four miles round, whatever part is dug, when we reach the depth of sixty three feet, and bore five feet deeper with an auger, the water springs out with such force, that a well is filled in a very short space of time. This water flows continually, and neither diminishes nor increases by the rain or drought. What is very remarkable in this ground, when we reach the depth of fourteen feet, we find pavements, and other ruins of an ancient town; as boards, houses, different pieces of mosaic work, &c. Below these, we find the ground very solid which is thought to have never been stirred; yet, below it, we find a moist earth mixed with vegetables: and at twenty six feet, are entire trees, as nut trees, with nuts on them, and a great quantity of branches and leaves of trees. At twenty eight feet depth, we meet with a friable chalk, mixed with many shells; and this bed is eleven feet in thickness; after which,

we again meet with vegetables; and thus alternately, chalk and earth mixed with vegetables, to the depth of sixty three feet: at which depth, is a bed of sand mixed with gravel and shells, like those formed on the coasts of the Italian sea. These successive beds of fenny or marshy earth and chalk, are always found in the same order, wherever we dig; and very often the auger meets with great trunks of trees, which it bores through, but with great trouble to the workmen. Bones, coals, flint, and pieces of iron, are also found. Ramazzini, who relates these circumstances, thinks, that the Gulf of Venice formerly extended beyond Modena; and that, perhaps, by the inundations of the sea, this ground has been formed.

It is evident, that considerable changes have taken place on the surface of the globe, not only by the action of fire, but also by water. The sea, from various circumstances, has repeatedly changed its bed. Authors have suspected, that the island of Great Britain was formerly united to the continent of France. On the coasts of France, England, Holland, and Germany, the sea has retreated in many parts. In Italy, a considerable tract of territory has been gained; and Ravenna, which was formerly a sea-port of the Exarques, is no longer a maritime town.

On the mountain of Stella, in Portugal, is a lake, in which the wrecks of ships have been found, notwithstanding this mountain is more than twelve leagues distant from any sea. Sabinus, in his commentaries on Ovid's *Metamorphoses*, says, that from monuments of history, it appears, that in the year 1460, a whole ship, with its anchors, was found in a mine of the Alps.

CHAP. V.

ANALOGIES BETWEEN ANIMALS AND VEGETABLES---ON THE NATURE OF MAN---OF INFANCY---MANHOOD---EXTENT OF HUMAN LIFE---OF THE SENSES---ANECDOTES ILLUSTRATIVE OF THIS SUBJECT.

AMONG the vast variety of objects with which the earth abounds, animals hold the first rank ; both on account of the relation they bear to man, and their superiority over vegetable and inanimate nature. The senses, figure, and motions of animals, afford them a more intimate connexion with surrounding objects, than vegetables possess. The latter, however, from their expansion, growth, and variety of parts which compose them ; are more intimately related to external objects, than minerals or stones, which are perfectly inert, and destitute of every vital principle. It is these relations alone, which render the animal superior to the vegetable, and the vegetable to the mineral.

What a variety of springs, powers, and mechanical movements, are included in that small portion of matter, which composes the body of an animal ! What a number of relations, what harmony, what correspondence among the different parts ! How many combinations, arrangements, causes, effects, and principles, all conspiring to accomplish the same grand design !

But how admirable soever this work may appear, the greatest miracle is not exhibited in the individual. It is in the successive renovation, and in the continued duration of the species, that nature assumes an aspect, inconceivable and astonishing. This faculty of reproduction, which is peculiar to animals and vegetables, must, with regard to us, continue to be so profound a mystery, that we shall probably never be able to investigate it with sufficient accuracy.

Even inanimate bodies have some properties, and the most imperfectly organized matter, possesses many relations with the other parts of the universe. We will not assert, however, that matter under whatever form it appears, is conscious of its existence, and of its relative powers ; we

shall only say, that being ignorant of the extent of our own connexion with external objects, we will not hesitate to pronounce inanimate matter to be infinitely more so. Besides, as our sensations have not the most distant resemblance to the causes that produce them, analogy obliges us to conclude, that dead matter, is neither endowed with sentiment, sensation, nor even a consciousness of its own existence.

With inanimate matter, therefore, we have no other relation than what arises from the general properties of bodies; as extension, impenetrability, gravity, &c. But, as relations purely material make no impression on us, and as they exist independent of us, they cannot be considered as any part of our being. Our existence, therefore, is an effect of organization, of matter with spirit. Matter, in this view, is not a principle but an accessory. It is a foreign covering, united to us in a manner unknown. But, in order to give a more perfect idea of the nature of man, let us trace him through the different stages of his existence.

At his birth, he is exposed to a new element, the air; but what his sensations are on the admission of this element into the lungs, is impossible to conjecture; only from his cries, we have reason to believe, they are attended with pain. The eyes of an infant, are indeed open, but they are dull, and appear to be unfit for the performance of any office whatever; the outward coat being wrinkled. The same reasoning will apply to most of the other senses. It is not till after forty days that he begins to smile; nor does he till then begin in reality to weep. The size of an infant, born at the full time, is twenty-one inches, though some do not exceed fourteen; and it generally weighs twelve, and sometimes fourteen pounds. The form of the body, and members, are by no means perfect: at the end of three days, it has a kind of jaundiced appearance, and milk is found in the breasts, which may be squeezed out with the fingers. The skulls of infants are not completely formed at the birth, but, in the language of the nursery, are open in a particular part; viz. at the top of the head: in this opening, a palpitation may sometimes be discovered, and above it, a species of scurf appears, which may be rubbed off with a brush. In this country, infants, as soon as born, are injudiciously and unnaturally laced with bandages, which ren-

der them unable to move a single joint. Nations which we call barbarous, act more rationally in this respect: the Siamese, Indians, Japanese, Negroes, the Savages of Canada, Virginia, Brasil, and almost all the inhabitants of South America, lay their infants naked in hanging beds of cotton, or in cradles lined with fur.

Infants sleep much, but it is often interrupted. They ought to have the breast every two hours in the day; and in the night, as often as they awake. It is of great importance to keep children clean and dry from their excrements. The American Indians, who cannot change their furs as frequently as we do our cloths, put under them the dust of rotten wood, and renew it as often as it gets damp. Great evils ensue from the negligence of nurses. Infants are sometimes left to cry for a considerable time, which often occasions diseases, especially ruptures, or at least, throws them into a state of lassitude, which deranges their constitutions. To palliate this, they are sometimes put into a cradle, and rocked to sleep; which may occasionally disorder the stomach and head. Before children are put up into the cradle, we ought to be certain they want nothing, and when they are rocked, it must never be with such violence as to stun or stupify them. The eyes of children are always directed towards the light, and if one eye only be directed to it, the other will probably become weak; both eyes, therefore, should be equally shaded, or equally exposed. Squinting is commonly the effect of injudicious treatment in this respect.

Respecting the teeth, the eight incisores, or fore-teeth, appear first. They are produced generally by pairs, from two months old to ten or twelve. The four canini or dog teeth, appear commonly about the 9th or 10th month; at the close of the first, or in the course of the second year, 16 others appear, called *molars*, or grinders. In the 5th, 6th, or 7th year, the fore-teeth, dog-teeth, and the first six of the grinders, naturally shed, and a new set appears; and at the age of puberty, or later, the *dentes sapientiæ*, or wise-teeth, appear.

The frames of infants, are less sensible of cold than during any other season of life. The pulse is strong, and it is therefore fair to conclude, that the internal heat is considerable.

Small animals, for the same reason, have more heat than great ones; because the action of the heart and arteries, increases in proportion to the smallness of the animal. Till the age of three years, the life of infants is extremely precarious; in the course of the second or third year, it becomes more certain; and at six or seven, a child has a greater probability of living than at any other period. It is remarked, that of a certain number of children born at the same time, above a fourth die the first year; above a third in two years, and at least one half in three years. By other calculations, it appears, that one half of the children born at the same time, are not extinct in less than seven or eight years.

At 12 or 15 months, infants begin to lisp. A, is the vowel which they pronounce with most ease. Of the consonants, B, M, P, T, are the most easy. In every language, therefore, *Baba, Mama, Papa, Tata*, are the first words that children learn. Some children pronounce distinctly at two years old; though the generality do not speak until two and a half, and frequently not so soon.

Some young persons cease growing at 14 or 15, while others continue their growth to 22 or 23. In men, the body attains its perfect proportion at the age of 30; and the persons of women, are generally complete at 20. The distance between the eyes, is less in man than in any other creature; in some animals, they are at so great a distance, that it is impossible they should ever view the same object, with both eyes at once. Men, and apes, are the only creatures that have eye-lashes on the lower eye-lids; other animals have them only on the upper. The upper eye-lid rises and falls, the lower has scarcely any motion.

The ancients, erroneously, considered the hair as a kind of excrement, and believed, that like the nails, it increased by the lower part pushing out the extremity. But the moderns have discovered, that every hair is a tube, which fills and receives nutriment like the other parts of the body. The roots, they observe, do not turn grey sooner than the extremities, but the whole changes its colour at once. We have known persons, the hair of whose heads has become grey in the short space of a night.

There is no part of the body which has been subject to such changes of fashion, as the hair and the beard. Some people, and among others the Turks, cut the hair off their heads, and let their beards grow. The Europeans, on the contrary, shave their beards, and wear their hair. The negroes shave their heads in figures at one time, in stars at another, in the manner of friars, and more commonly in alternate stripes; and their little boys are shaved in the same manner. The Talapoins, of Siam, shave the heads and eyebrows of such children as are committed to their care. Every nation seems to have entertained different prejudices in favour of one part or another of the beard.

The neck, which supports the head and unites it to the body is much more considerable in most quadrupeds than in man. Fishes, and animals that have not lungs similar to ours, have no neck. Birds, in general, have the neck longer than any other kind of animal; and those which have short claws, have also short necks: on the contrary, those that have them long, the neck is proportionate.

The human breast is formed in a very different manner from that of other animals; and is larger in proportion to the size of the body. None but man, and such animals as use their fore feet as hands; as monkeys, bats, and squirrels, are found to have those bones called clavicles or collar bones. The breasts of women are larger than those of men, though those of the latter are formed in the same manner; and milk is sometimes found in them as well as in those of women. Birds, and all oviparous animals, have no teats; but viviparous fishes, as the whale and the dolphin, have both teats and milk.

Little is known with regard to the exact proportion of the human figure. Some, who have studied after the ancient masters, divide the body into ten times the length of the face, and others divide it into eight. They tell us, that there is a similitude of proportion in different parts of the body: that the hand is the length of the face; and the thumb the length of the nose; that the space between the eyes is the breadth of the eye; that the breadth of the thickest part of the thigh is double that of the thickest part of the leg, and treble the thinnest, &c.

NATURAL HISTORY.

The strength of man is very considerable when matured by practice. We are assured, that the porters of Constantinople carry burthens of nine hundred pounds weight; and Mr. Desaguliers mentions a man, in an upright posture, who, by distributing a certain number of weights in such a manner, that every part of his body bore its share, was able to support a weight of two thousand pounds.

The strength of a man may be farther estimated by the continuance of his labour, and the agility of his motions. Men, who are exercised in running, outstrip horses, or at least continue their speed for a greater length of time. In a journey, after a man and a horse have proceeded together for several days, the former will be fresh when the latter is quite tired. The royal messengers of Ispahan, run thirty-six leagues in fourteen or fifteen hours; and travellers assure us, that the hottentots out-run lions in the chace; and that the savages who hunt the elk, which is as fleet as a stag, pursue it until they take it. The civilized man is ignorant of his own strength; he is not sensible how much he loses by effeminacy, and how he might increase it by the habit of vigorous exercise.

To complete our description of man, it will be proper to investigate the human countenance, as it appears among ourselves, when agitated by the passions. In affliction, joy, love, shame, and compassion, the eyes are apt to be swelled, and, as it were, obscured by an overflow of tears. The effusion of these is always accompanied with a tension of the muscles of the visage, by which there is occasioned an opening of the mouth. At the same time, the natural moisture in the nose becomes more copious, and by internal passages, mixes itself with the lachrymal moisture; which, however, flows only at intervals.

By grief, the two corners of the mouth are lowered, the under lip raised, the eye-lids are half closed, and the pupils of the eyes are almost covered: the other muscles of the face are so much relaxed, that the space between the mouth and the eyes is larger than ordinary, and consequently the countenance assumes a lengthened appearance.

Fear, terror or horror, wrinkles the forehead, raises the eye-brows, extends the eye-lids as much as possible, and discovers a part of the white of the eye over the pupil,

which is lowered, and somewhat concealed by the inferior eye-lid. The mouth, at the same time, is widely opened, and both the upper and under teeth appear.

Contempt or derision, raises the upper lip on one side, and on the other there is a little motion, as if inclined to smile. The nose is shrivelled on the same side on which the lip is raised, and the corner of the mouth is extended. The eye on the same side is almost shut, while the other is open as usual, but the pupil of each is lowered, as when one looks downwards.

By jealousy, malice, and envy, the eye-brows fall down, and are knit; the eye-lids are raised, and the pupils lowered. The under lip is raised on each side, while the corners of the mouth are rather lowered, and the middle of the under lip raised, in order to join the middle of the upper one.

By laughter, the corners of the mouth are extended and somewhat raised; as are the upper part of the cheeks; and the eyes are more or less closed. The upper lip also is raised, while the under is lowered; and, in moderate laughter, the mouth is opened, and the skin of the nose contracted. Where there is a good natural constitution it is not impossible, but by moderating the passions, temperance, and sobriety, to extend the period of life for a few years. But even of this, there seems to be an uncertainty; for, if it is necessary that the body should employ its whole strength, that it should consume whatever it is capable of consuming, that it should undergo every possible exercise, whence could any benefit accrue from regimen, and abstinence? Men, no doubt, there are, who have outlived the usual period of human existence. Not to mention Par, who lived to the age of one hundred and fifty two, and Jenkins, to that of one hundred and sixty nine, as recorded in the Philosophical Transactions; we have many instances of the prolongation of life to one hundred and ten, and even to one hundred and twenty years. Yet, this longevity was owing to no peculiar art or management; for it appears that the greater number of such long lived were peasants, or persons accustomed to the greatest fatigues.

If, in the duration of life, there is any difference to be found, it seems proper to ascribe it to the quality of the air. In elevated situations, old people are more generally found

than in low ones. In the mountains of Scotland and Wales, Auvergne, and Switzerland, there have been more instances of extreme longevity than in the plains of Holland, Flanders, Germany or Poland. Human life is, however, nearly the same in every country; accidental distresses excepted. The common verge of existence is, ninety or an hundred years, which has been the case since the days of David, without much variation.

The following table of the probabilities of human life, has been compiled from a careful examination of many country registers of burials in France, compared with the mortality bills of Paris.

TABLE

OF THE PROBABILITIES OF THE DURATION OF LIFE.

Age.			Age.			Age.		
Duration of Life.			Duration of Life.			Duration of Life.		
Years.	Yrs.	Mths.	Years.	Yrs.	Mths.	Years.	Yrs.	Mths.
0	8	0	29	28	6	58	12	3
1	33	0	30	28	0	59	11	8
2	38	0	31	27	6	60	11	1
3	40	0	32	26	11	61	10	6
4	41	0	33	26	3	62	10	0
5	41	6	34	25	7	63	9	6
6	42	0	35	25	0	64	9	0
7	42	3	36	24	5	65	8	6
8	41	6	37	23	10	66	8	0
9	40	10	38	23	3	67	7	6
10	40	2	39	22	8	68	7	0
11	39	6	40	22	1	69	6	7
12	38	9	41	21	6	70	6	2
13	38	1	42	20	11	71	5	8
14	37	5	43	20	4	72	5	4
15	36	9	44	19	9	73	5	0
16	36	0	45	19	3	74	4	9
17	35	4	46	18	9	75	4	6
18	34	8	47	18	2	76	4	3
19	34	0	48	17	8	77	4	1
20	33	5	49	17	2	78	3	11
21	32	11	50	16	7	79	3	9
22	32	4	51	16	0	80	3	7
23	31	10	52	15	6	81	3	5
24	31	3	53	15	0	82	3	3
25	30	9	54	14	6	83	3	2
26	30	2	55	14	0	84	3	1
27	29	7	56	13	5	85	2	6
28	29	0	57	12	10			

By this Table, it appears, that we may lay or bet one to one, that an infant newly born, will live eight years, that an infant of one year, will live thirty-three years longer; that an infant of two years, will live thirty-eight years longer; that a man of twenty, will live thirty-three years and five months longer; that a man of thirty, will live twenty-eight years longer; &c. of every other age.

Ideas of external things, are conveyed to the soul of man by means of the five senses, *seeing, bearing, feeling, tasting, and smelling*. The organs by which the senses act, are the nerves; which are small thread-like fibres distributed over the whole body, and all of them connected with the brain.

The eyes seem to be formed very early in the human embryo. In the chicken also, of all the parts that are double, they are the soonest produced; and I have observed upon the eggs of several sorts of birds, as well as upon those of lizards, that the eyes were much larger and earlier in their expansion, than any other parts of two-fold growth. Though in viviparous animals, and particularly in man, they are, at first, by no means so large in proportion as in the oviparous classes; yet, they obtain their due formation sooner than any other parts of the body. This is also the case with the organ of hearing. The little bones that assist in constructing the internal part of the ear, are entirely formed before any of the other bones have acquired any part of their growth or solidity. Hence it is evident, that the parts of the body, which are furnished with the greatest quantity of nerves, are those which appear first, and which first attain to perfection.

Mr Cheselden, having couched for a cataract a lad of thirteen years of age, who had been blind from his birth, and thus communicated to him the sense of seeing, was at great pains to mark the progress of his visual powers. The youth, though hitherto incapable of seeing, was not absolutely and entirely blind. Like every other person whose vision is obstructed by a cataract, he could distinguish day from night, and even black from white, or either from the vivid colour of scarlet. Of the form of bodies, he could distinguish nothing, nor of colours themselves, unless the light was strong. The operation was performed upon one eye; and when he saw for the first time, he was so far from

forming the least conception of distances, that he supposed (as he himself expressed it) every thing he saw touched his eyes, in the same manner as every thing he felt touched his skin. The objects that pleased him most, were those the surfaces of which were plain, and the figures regular; though he could neither judge of their different forms, nor give any reason why he preferred the one to the other. The ideas he had entertained of colours, during his former dark state, were so imperfect, that when he saw them in reality, he could hardly be persuaded they were the same. When such objects were shewn him, as he had been formerly familiar with by the touch, he beheld them with earnestness, in order to distinguish them a second time. Of these, however, he had too many to retain at once, of course the greatest number were forgot; and for one thing which he recollected upon seeing a second time, there were a thousand of which he had not the least remembrance. He was very much surprised to find, that persons and objects which he had loved best, were not the most pleasing to the eye; nor could he help expressing his disappointment in finding his parents less handsome than he had conceived them to be. Before he could distinguish that a picture resembled a solid body, above two months elapsed; till then, he only considered it as a surface diversified by a variety of colours: but when he began to perceive that these shadings actually represented human beings, he also began to examine, by the touch, whether they had not the usual qualities of such bodies; and great was his surprise to find what he had imagined a very unequal surface, to be smooth and even. He was then shewn a miniature portrait of his father, which was contained in his mother's watch-case; and though he readily perceived the resemblance, he expressed his astonishment how so large a face could be comprised in so small a compass: to him, it appeared as strange, as that a pint-vessel should contain a bushel. As first, he could bear but a very small quantity of light, and he saw every object much greater than the life: but in proportion as he observed objects that were really large, he conceived the others to be diminished. Beyond the limits of what he saw, he had no conception of any thing: although he knew that the apartment he occupied was only a part of the house, he could not

conceive how the latter should seem larger than the former. Before the operation, he had no great expectation of the pleasure he should receive from the new sense he was promised: that by it he might be enabled to read and write, was his grand object. He said, that he could enjoy no greater satisfaction from walking in the garden, with this sense, than without it; because there he already walked at his ease, and knew all the walks. With great truth he also observed, that his blindness gave him one advantage over the rest of mankind; an advantage which indeed he retained long after he had acquired the sense of seeing; namely, that of being able to walk in the dark with confidence and security. He had, however, no sooner begun to enjoy this new sense, than he was transported beyond measure; and declared, that every new object opened to him a fresh source of delight. About a year after, he was carried to Epsom, where there is a beautiful, and an extensive prospect: with this he appeared greatly charmed; and the landscape before him, he called a new method of seeing. He was couched in the other eye, a year after, and of both operations the success was equal. When he saw with both eyes, every thing appeared to him twice as big as when he saw but with one; although he did not see double, or at least he discovered no marks from which any such conclusion could be inferred.

Distance is only conceived by experience, for the more distant an object is, the less it appears. When, from certain circumstances, we cannot form a just conception of distance, and when we cannot judge of objects but by angles, or rather by the image, which they form in our eyes, we are then necessarily deceived as to their size. Every man has felt, how liable we are in travelling by night, to mistake a bush which is near for a tree at a distance, or indeed a distant tree for a bush at hand. In the same manner, if we do not distinguish objects by their shape, and if we cannot by it judge of distances, the same fallacy will still continue. In this case, a fly, which may pass before us with rapidity, will seem to be a bird at a considerable distance; and a horse which may be in the middle of a plain, and in an attitude similar, for instance, to that of a sheep, will seem to be no bigger than a sheep, till we have discovered that it is a horse.

If, therefore, we are benighted in a strange place, where no judgment can be formed of distance, we are every moment liable to the deception of vision. Hence originate the dreadful stories of spectres, and those wonderful, hideous, and gigantic figures, which so many persons have seen. Though such figures, it is commonly asserted, exist solely in the imagination; yet it is highly probable, that they might appear to the eye, in the manner above described. This remark will be allowed to be the more probable, when we consider, that whenever we cannot judge of an object but by the angle which it forms in the eye, this object is magnified according to its propinquity. And that, if it seemed at first to the spectator, when at some distance from it, a few feet high, it must appear to him, when within a few paces of it, of a size stupendously increased. At this he must naturally be terrified, till he touches the seemingly gigantic object, and in that instant, it will diminish, and appear to him what it really is. If, on the other hand, he is afraid to approach it, and flies from the spot with precipitation, the only idea he will form, will be that of an image, gigantic in its size, and dreadful in its form. Hence, such visions depend not, as philosophers have supposed, on the imagination only; but originate from real facts.

Deception is not, however, confined to sight only, for hearing is liable to similar mistakes. By this organ, no distinct intelligence is conveyed of the distance whence a sounding body is heard. A great noise, if distant, and a small one very near, produce the same sensation; and, unless we receive information from some other sense, we cannot accurately tell whether the sound be great or small; and it is not, till we have by experience become acquainted with any particular sound, that we can judge of the distance whence it came. When for example, we hear the tone of a bell, we are at no great loss to determine the distance.

One body striking against another, produces sound; which is simple in bodies that are non-elastic, and often repeated in such as are. If we strike a bell, for instance, a single blow produces a sound, which is repeated by the undulations of the sonorous body; and multiplied, as often as it undulates or vibrates. These undulations succeed each other so fast, that the ear supposes them one continued sound;

whereas they form many sounds. Sounding bodies are, therefore, of two kinds; elastic and non-elastic. The latter, when struck, return single sounds; and the former return a succession of sounds, which form a tone. This tone may be considered as a great number of sounds, all produced one after the other, as we find in a bell, which continues to sound for some time after it is struck. A continuing tone may also be produced from a non-elastic body, by repeating the blow quick and often, as when we beat a drum, or when we draw a bow along the string of a fiddle.

To know the manner in which musical sounds become pleasing, it must be observed, no one continuing tone, how loud or swelling soever, can afford delight. We must have a succession of them, and those in the most pleasing proportion. The nature of this proportion may be thus conceived. If we strike a body incapable of vibration, with a double force, or what amounts to the same thing, with a double mass of matter, it will produce a sound that is doubly grave. Music, according to the ancients, was first invented from the blows of different hammers on an anvil. Suppose then we strike an anvil with a hammer of one pound weight, and again with a hammer of two pounds, it is plain, that the two pounds hammer will produce a sound twice as grave as the former. But if we strike with a two pounds hammer, and then with a three pounds it is evident, that the latter will produce a sound one-third graver than the former. If we strike the anvil with a three pounds hammer, and then with a four pounds, it will likewise follow, that the latter will be one-fourth graver than the former. Now, in comparing those sounds, it is obvious, that the difference between one and two, is more easily perceived than that between two and three, three and four, or any number succeeding in the same proportion. The succession of sounds, therefore, will please in proportion to the ease with which they are distinguished. That sound which is double the former, or the octave to the preceding tone, will be the most pleasing. The next to that, which is as two to three, or the third, will be the most agreeable. And universally, those sounds the difference of which may be most easily compared, are the most agreeable.

Sound has, in common with light, the property of being extensively diffused; and like it, admits of reflection; the laws of which are less understood than those of light. All we know is, that sound is principally reflected by hard bodies, and that their being hollow, increases the reverberation. The internal cavity of the ear, which is fashioned in the temporal bone like a cavern cut in a rock, is well calculated for the purposes of echoing sound with the greatest precision.

One of the most common complaints in old age, is deafness; which probably proceeds from the rigidity of the nerves in the labyrinth of the ear. This disorder also, proceeds from the stoppage of the wax, which art may easily remedy. In order to know whether the defect be internal or external, let the deaf person put a repeating-watch into his mouth; and if he hears it strike, he may be assured his disorder proceeds from an external cause.

It often happens, that people hear better with the one ear than the other; but these have, what musicians call, a bad ear. I have made several experiments on persons of this description; and I have uniformly found, that their defect, in judging properly of sounds, proceeded from the inequality of their ears, and from their receiving by both, at the same time, unequal sensations. In like manner, as such persons hear falsely, they will, without knowing it, sing so. They also frequently deceive themselves with regard to the side whence the sound comes, generally supposing it to make its impression on the best ear.

Hearing is a much more necessary sense to man than to animals. In these it is only a warning against danger, or an encouragement to mutual assistance; but in man, it is the source of most of his pleasures; and without it, the rest of his senses would be of little benefit. A man born deaf, must necessarily be dumb; and his whole sphere of knowledge must be bounded by sensual objects. We have a singular instance of a young man who, being born deaf, was restored, at the age of twenty-four, to perfect hearing. The account, which is given in the memoirs of the Academy of Sciences, is as follows:

“A young man, of the town of Chartres, between the age of twenty-three and twenty-four, the son of a tradesman,

and deaf and dumb from his birth, began to speak all of a sudden, to the utter astonishment of the whole town. He gave them to understand that, about three or four months before, he had heard the sound of the bells, and was greatly surprised at this new and unknown sensation. After some time, a kind of humour issued from his left ear, and he then heard perfectly well with both. During these three months, he listened to every thing; and without attempting to speak aloud, he accustomed himself to utter softly the words spoken by others. He also laboured hard to acquire the pronunciation of words, and the ideas of which they were expressive. At length, having supposed himself qualified to break silence, he declared, that he could now speak, though as yet but imperfectly. Soon after, an able Divine questioned him concerning the ideas of his past state; and principally with respect to God, his soul, the moral beauty of virtue, and deformity of vice; but the young man had not directed his solitary speculations into that channel. He had gone to mass with his parents, had learned to sign himself with the cross, to kneel down, and to assume all the grimaces of a man in the act of devotion; but he did all this without knowing the intention of the cause; he saw others do the like, and that was enough for him. He had formed no idea of death, but had led a life of pure animal instinct; and though entirely taken up with sensible objects, and such as were present, he did not seem to have made such reflections even upon these, as might reasonably have been expected. The young man, however, was not deficient in understanding; but the understanding of a man, deprived of all commerce with others, is so very confined, that the mind may be said to be under the controul of its immediate sensations."

It is very possible to communicate ideas to deaf men which they previously wanted; and to give them very precise notions of abstract, and general subjects, by means of signs and letters. A person born deaf may, by time and application, be taught to read, write, and even by the motion of the lips, to understand what is said to him. This is a plain proof, how much the senses resemble and may supply the defects of each other. It is probable however, that as most of the motions of speech are made within the

mouth by the tongue; the knowledge, from the motion of the lips, can be but very confined.

The sense of feeling is universal, but it employs itself differently in different parts of the body. The sensation which results from feeling, cannot be excited otherwise than by the contract and immediate application of the surface of some foreign body to that of our own. If we apply a foreign body against the breast, or upon the shoulder of a man, he will be sensible of the impression, but cannot form any idea of its shape; because the breast only touches it in a single plain or surface. It is the same with respect to all other parts of the body, which cannot adjust themselves to the surfaces of foreign bodies, nor bend to embrace, at once, many parts of their superficies. These parts of our body cannot, therefore, give any just idea of their form; but those, on the contrary, which, like the hand, are divided into many small, flexible, and moveable parts; and can apply themselves at one and the same time to the different plains of the superficies of the body, are the parts which give us ideas of their form and size.

It is not because there is a greater quantity of nervous tufts at the extremity of the fingers than in any other part of the body; it is not, as is vulgarly pretended, because the hand has the most delicate sense, that it is in effect the principal organ of feeling: for there are parts more sensible, and where the feeling is more delicate, as the eyes, the tongue, &c. but it is owing to the hand being divided into many moveable parts, all flexible, all acting at the same time, and all obedient to the will, that we acquire distinct ideas of the forms of bodies. Animals, which have hands, appear to be the most acute; thus, apes do things so like the mechanical actions of man, that it seems as if they had the same succession of corporeal sensation for the cause of them; and those which have no hands, nor any part divided and flexible enough to be able to adjust itself upon the superficies of bodies, cannot have any precise notion of the form, or size of them. It is for this reason, that we often see them in suspense, or frightened at the aspect of objects which are most familiar to them. The principal organ of feeling is their muzzle, and the tongue serves them to touch bodies, which they turn again and again, before they take them between their teeth.

It is therefore to the sense of feeling, that we are indebted for the power of usefully exercising all our other faculties. One man does not, perhaps, possess more ingenuity or capacity than another; but because in his earliest infancy he made a greater and a readier use of this sense. As soon as children are of sufficient age, they manifest a disposition to use their hands, and are fond of touching whatever is presented to them; they amuse themselves by handling every thing they are capable of, and seem as if they were endeavouring to find out their form by touching them on every side.

CHAP VI.

OF THE APPARENT VARIETIES IN THE HUMAN SPECIES----LAPLANDERS---TARTARS---CHINESE---JAPANESE---FORMOSANS---MOGULS---PERSIANS---ARABIANS---CIRCASSIANS---TURKS RUSSIANS---NEGROES---HOTTENTOTS---AMERICANS---CAUSES OF THIS VARIETY.

THERE are many causes which contribute to produce an apparent variety between the different nations of the earth: climate, food, manners, and customs, make not only a difference in sentiment, but even in the external form.

In examining the surface of the earth, and beginning our enquiries at the north, we find in Lapland, and in the northern parts of Tartary, a race of small-sized men, whose figure is uncouth, and physiognomy wild as their manners are unpolished. Though they seem to be a degenerate species, they are very numerous, and occupy vast regions.

The Laplanders, Danes, Swedes, Muscovites, the inhabitants of Nova-Zembla, the Borandians, Samoeids, Ostiacs of the Old Continent; and the Greenlanders, and savages to the north of the Esquimaux Indians of the New, appear to be of one race, which has been extended and multiplied along the coasts of the northern seas, and over deserts, considered as uninhabited by every other nation. In these countries, the visage is large and broad; the nose, flat and short; the eyes of a yellowish brown, inclining to black; the eyelids, drawn towards the temples; the cheek-bones, extremely

prominent; the mouth, very large; the lower part of the countenance, narrow; the lips, thick and turned outward; the voice shrill; the head, bulky; the hair, black and straight; and the skin, tawny. They are small in stature; and, though meagre, are of a squat form. In general, their size is about four feet, nor do the tallest exceed four and a half; and among these people, if there is any difference to be found, it depends on the degrees of deformity.

The Danish Laplanders have a large black cat, which they make a confidant in all their secrets, and a counsellor in all their difficulties; and the Swedish Laplanders have a drum in every family, for the purpose of consulting the devil: and though the natives of these countries are robust and nimble, there is reason to suppose, that they cannot live but in their own country, and in their own manner. In travelling over the ice and snow, they use skates made of fir, which are about two feet long, and half a foot broad, raised and pointed before, and fastened to the feet by straps of leather: with these they descend the steepest mountains, scale the most craggy precipices, and easily overtake the swiftest animals. They also use a pole, pointed at one end with iron, and rounded at the other; which serves to push them along, direct their course, keep them from falling, stop the impetuosity of their career, and to kill what game they overtake: nor are the women less skilful in such exercises. They are all accustomed to the bow and arrow; and it is asserted, that the Muscovite Laplanders lanch a javelin with so much dexterity, that at the distance of thirty paces, they are sure to hit a mark no larger than a silver crown, and with such force, that it will transfix a human body. As huntsmen, their favourite pursuit is that of the ermine, the fox, the lynx, and the martin; of these animals, they barter the skins for their favourite articles of luxury, brandy and tobacco.

In winter, the Laplanders clothe themselves with the skins of the rein-deer, and in summer, with the skins of birds. To the use of linen they are perfect strangers. The women of Nova-Zembla have their noses and ears pierced, in order to have them ornamented with pendants of blue stone; and as an additional lustre to their charms, they form blue streaks upon their foreheads and chins. Those of Greenland dress themselves with the skins of the dog-fish; they also paint

the visage with blue and yellow colours, and wear pendants at their ears. They all live under ground, or in huts almost covered with earth and the bark of certain trees, or the skins of fishes. Some even form subterranean trenches, by which one hut communicates with another; and thus, during the winter months, they enjoy the conversation and society of their neighbours. A continued series of darkness for several months, obliges them to illuminate their dreary abodes with lamps, which they keep alive with the very train-oil they use as drink. Under all these hardships, they are subject to few diseases, and they live to a prodigious age. So vigorous, indeed, are the old men, that they are hardly to be distinguished from the young. The only infirmity they experience, and it is an infirmity common to them all, is blindness: for their eyes being dazzled by the strong reflection of the snow in winter, and enveloped in clouds of smoke in autumn and spring, when advanced in years, they seldom retain their sight.

The Tartar country, in general, comprehends the greatest part of Asia, and extends from Russia to Kamtschatka. It is from eleven to twelve hundred leagues long, and about seven hundred broad; of course its circumference is twenty times larger than that of the kingdom of France.

All the Tartar nations have the upper part of the visage very large and wrinkled, even in their youth. Their nose, is short and flat; their eyes, little and sunk in the head; their cheek-bones, high; the lower part of their visage, narrow; their chin, long and prominent with little or no beard; their teeth, long and straggling; their eye-brows, so large as to cover the eyes; their eye-lids, thick; the face, broad and flat; their complexion, tawny; and their hair, black. They have thick thighs, and short legs; and though but of a middling stature, are remarkably strong and robust. The ugliest of them are the Calmoucks, in whose appearance there seems to be something frightful. They are all wanderers and vagabonds; and their only shelter is that of a tent made of hair or skins. Their food is horse, and camels flesh, either raw or a little sodden between the horse and the saddle: they also eat fish dried in the sun; and their common drink is mare's milk, fermented with the meal of millet. They all have the head shaved, except a tuft on the top, which they

let grow, to form into tresses on each side of the face. The women, who are as deformed as the men, wear their hair, which they bind up with bits of copper, and other ornaments of the same nature.

The majority of these tribes are strangers to religion, morality, and decency. They are robbers by profession; and the natives of Daghestan, who live in the neighbourhood of more polished countries, carry on a great traffic of slaves, whom they carry off by force, and afterwards sell to the Turks and Persians. Their wealth consists chiefly of horses, which are, perhaps, more numerous, than in any other part of the world. They are taught, by custom, to live in the same place with their horses; are continually employed in training and exercising them; and, at length, they reduce them to such implicit obedience, that they actually appear to understand the intention of the rider.

The limbs of the Chinese are well proportioned, their bodies are large and fat, and their visages, large and round. Their eyes are small; their eye-brows, large; their eye-lids turned upwards; their noses, short and flat; upon their chins there is very little hair, and upon each lip there are not more than seven or eight prickles. Those who inhabit the southern provinces of the empire, are more brown and tawny than the others. In colour, they resemble the natives of Mauritania, and the more swarthy Spaniards; but those who inhabit the middle provinces, are as fair as the Germans.

Le Gentel, assures us, that the Chinese women do every thing in their power to make their eyes appear little, and oblong: for this purpose, it is a constant practice with the little girls, from the instruction of their mothers, forcibly to extend their eye-lids; and with the addition of a nose thoroughly compressed and flattened; ears long, large, open, and pendant, they are accounted complete beauties. He adds, that their complexions are delicate; their lips, of a fine vermilion; their mouths, well proportioned; their hair, very black; but that, by the use of paint, they so greatly injure their faces, that before the age of thirty, they have every appearance of old age.

So strongly do the Japanese resemble the Chinese, that we can hardly scruple to rank them in the same class. As being inhabitants of a more southern climate, they only

differ from them in being more yellow, or more brown. In general, their stature is small; their faces as well as their noses, are broad and flat; their hair, black; and their beards little more than perceptible. They are haughty, fond of war, full of dexterity and vigour, civil and obliging, smooth-tongued and courteous; but fickle and vain. With astonishing patience, they sustain hunger, thirst, cold, heat, fatigue, and all the other hardships of life. Their ceremonies, or rather grimaces in eating, are numerous and uncouth. They are laborious, very skilful artificers, and in a word, have nearly the same disposition, and the same manners and customs, as the Chinese.

One custom, which they have in common and which is not a little fantastic, is, so to contract the feet of the women, that they are hardly able to support themselves. Some travellers mention, that in China, when a girl has passed her third year, they break her feet in such a manner, that the toes are made to come under the soles; that they apply to them a strong water which burns away the flesh; and then wrap them up in a number of bandages till they assume a certain fold. They add, that the women feel the pain of this operation all their lives, that they walk with great difficulty, and that their gait is, to the last degree, ungraceful. Other travellers do not say that they break their feet in their infancy, but that they only compress them with so much violence as to prevent their growth: yet they unanimously allow, that every woman of condition, particularly every handsome woman, must have a foot small enough to enter, with ease, the slipper of a child of six years old.

Though the inhabitants of the kingdoms of Pegu and Aracan are blacker, they bear a considerable resemblance to the Chinese. Those of Aracan put great value upon a forehead large and flat; and in order to render it so, they apply a plate of lead to the forehead, as soon as a child is born. Their nostrils are large and extended; their eyes, small and lively; and their ears are of such a length, as to hang over their shoulders. They feast, with a relish, on mice, rats, serpents, and fish. Their women are tolerably fair, and their ears are as long as those of the men. The people of Achan, who are situated farther to the north than those of

Aracan, have also a flat visage, and an olive-coloured skin. They allow their boys to go quite naked, and their girls with only a slight plate of silver over those parts which nature dictates to conceal.

Northward of the Philippine Islands, is situated the island of Formosa, of which the natives, though at no great distance from the coast of Fokian in China, bear not the least resemblance to the Chinese. According to Struys, the Formosans are of a small stature, particularly those who inhabit the mountains, and their visage is broad. The women have large and full breasts, and beards like the men. Their ears, are naturally long, and they render them still more so, by certain thick shells which they wear as pendants. Their hair is very black and long, and their complexions, yellowish. These islanders, though averse to labour, are admirably skilled in the use of the javelin, and the bow: they are also excellent swimmers; and when they run, their swiftness is incredible.

The Moguls, and the other inhabitants of the peninsula of India, are not unlike the Europeans in shape and features; but they differ more or less from them in colour. The Moguls are of an olive complexion; and yet, in the Indian language, the word *Mogul* signifies *White*. The women are extremely delicate, and they bathe very often. They are of an olive colour, as well as the men; and, contrary to what is seen among the women of Europe, their legs and thighs are long, and their bodies short. Tavernier says, that, after passing Lapor and the kingdom of Cashmire, the women have no hair on any part of the body, and the men hardly any beards. According to Thevenot, the Mogul women are tolerably fruitful, though exceedingly chaste. They likewise suffer little from the pains of child-birth, and are often known to be abroad the day following. He adds, that in the kingdom of Decan, they are allowed to marry; the husband by his tenth, and the wife by her eighth year; and at that age they very often have children. The women, who become mothers so soon, usually cease bearing, before they arrive at thirty; and by that period, appear wrinkled and marked with all the deformities of age.

The customs of the different nations of India, are very singular, if not whimsical. The Banians eat nothing which has had life in it; and they are even afraid to kill the smallest

reptile, however offensive to them. They throw rice and beans into their rivers as food for the fish; and grain of different kinds upon the earth, for the birds and insects. When they meet with a huntsman, or a fisher, they beg of him instantly to desist from his employment. If he remains deaf to their entreaties, they offer him money for his gun, or his nets; and when no persuasion, no offer, will avail, they trouble the water, to frighten the fish; and shout vehemently to put the birds and other game to flight.

In Ceylon, there is a species of savages denominated *Bedas*, which occupies a small district on the north part of the island; and seems to be totally different from the surrounding nations. The spot they inhabit, is entirely covered with wood; amidst which, they keep themselves so closely concealed, that it is with great difficulty they are discovered. Their complexion is fair, and sometimes red, like that of the Europeans. They do not speak the language of Ceylon; nor indeed has their language the least affinity with that of any of the other Indians. They have no villages, no houses, no intercourse with the rest of mankind. Their arms are the bow and the arrow, with which they destroy a number of boars, stags, and other animals. They never dress any meat, but sweeten it with honey, which they possess in great abundance.

The inhabitants of Persia, Turkey, Arabia, Egypt, and the whole of Barbary, may be considered as one and the same people; who, in the time of Mahomet and his successors, invaded immense territories, extended their dominions, and incorporated with the original natives of those countries. The Persians, the Turks, and the Moors are, to a certain degree, civilized; but the Arabians have, for the most part, remained in a state of independence, which implies a contempt of laws. They live, like the Tartars, without order, without government, and almost without society. Theft, robbery, and violence, are authorised by their chiefs; they glory in their vices; and of all human conventions, they only have admitted those, which owe their existence to fanaticism and superstition.

They are a people much inured to labour; and to it they habituate their horses. They allow this animal to eat and drink but once in twenty-four hours; and though their hor-

ses are meagre, they are excellent coursers, and seem indefatigable.

The Egyptian women are very brown; their eyes are lively; their stature, low; their mode of dress is by no means agreeable; and their conversation is perfectly tiresome. But though the women in general, are short, the men are of a good stature. Both are of an olive colour; and the farther we remove from Cairo, the people are more tawny, till we reach the confines of Nubia, where they are as black as the Nubians themselves.

The most inherent defects of the Egyptians, are idleness and cowardice: they do nothing but drink coffee, smoke, and sleep, or chatter in the streets. They are very ignorant, and full of the most ridiculous vanity; and though they cannot deny but that they have lost every thing noble they once possessed; as the sciences, the exercise of arms, their history, and even their language; and that, from an illustrious and valiant nation, they are become a people dastardly and enslaved; and they scruple not to despise other nations, and to take offence at the bare offer to carry their children to Europe, to initiate them in the arts and sciences.

"The women of Circassia," says Struys, "are exceedingly fair and beautiful; their complexions are incomparably fine, their foreheads, large and smooth; and, without the assistance of art, their eye-brows are so delicate, that they appear like threads of silk. Their eyes are large, soft, and full of animation; their mouths, small and expressive of a smile; and their chins, perfect ovals. Their necks and breasts are admirably formed; their stature is tall, and the shape of their bodies, easy; their skin, is white as snow, and their hair of the most beautiful black. They wear a little cap of black stuff, over which they fasten a roller of the same colour; but, what is truly ridiculous, instead of this roller, the widows wear the bladder of an ox, or a cow, inflated as much as possible, by which they disfigure themselves amazingly. In the summer months, the inferior classes wear nothing but a shift, which is open down to the middle, and generally of a blue, yellow, or red colour. They are tolerably familiar with strangers, but at the same time faithful to their husbands, who are by no means jealous of them."

The Turks, who purchase a vast number of these women as slaves, are a people composed of many different nations. From the Armenians, the Georgians, the Turcomans, intermixing in the times of the crusades, with the Arabians, the Egyptians, and even the Europeans; it is hardly possible to distinguish the native inhabitants of Asia Minor, of Syria, and of the rest of Turkey. The Turkish men are generally robust, and tolerably well made; and it is very rare to find among them persons either hump-backed or lame. The women, in general, are beautiful, well proportioned, and free from blemishes; and when they go abroad, are always veiled.

Before the Czar, Peter I. we are told, that the Muscovites had not emerged from barbarism. Born in slavery, they were ignorant, brutal, cruel, and destitute of courage. Men and women bathed promiscuously in stoves, heated to a degree intolerable to all persons but themselves; and on quitting this warm bath, would plunge, like the Laplanders, into cold water. Their food was homely, and their favourite dishes were cucumbers, or melons of Astracan; which, in summer, they preserved in a mixture of water, flour, and salt. From ridiculous scruples, they abstained from several viands; amongst which were pigeons and veal. Nevertheless, at this period of rudeness, the women were skilled in the arts of colouring the skin, plucking out the eye-brows, and painting artificial ones. They also adorned themselves with pearls, and jewels; and their garments were made of ~~rich~~ and valuable stuffs. From these circumstances it appears, that the barbarism of the Muscovites was near a close, and that their sovereign would have less trouble in polishing them than some authors have endeavoured to insinuate. They are now a people in some degree civilized and commercial, fond of spectacles, and other ingenious novelties.

From the regions of Europe and Asia, our attention is now to be directed to a race of people differing more from ourselves in external appearance than any we have hitherto mentioned.

In the latitude of seventeen or eighteen degrees north, on the African Coast, the neighbourhood of the ocean, and the Red Sea, we find the Negroes of Senegal, and Nubia. After these, all the nations of Africa, from the latitude of

eighteen north to eighteen south, are black; the Ethiopians, or Abyssinians excepted. It appears, then, that that portion of the globe which Nature has allotted this race of men, contains an extent of about nine hundred leagues in breadth, and considerably more in length, especially northward of the equator. Beyond the latitude of eighteen or twenty, there are no Negroes, as will appear when we come to speak of the Caffres, and the Hottentots.

By confounding the Ethiopians with their neighbours the Nubians, we have been long in an error with respect to their visage and colour. Marmol, says, they are absolutely black, their visages, large; and noses flat; and, in this description, the Dutch travellers agree with him. The truth is, they differ from the Nubians, both in colour and features. The skin of the Ethiopians is brown, or olive-coloured, like that of the southern Arabians, from whom, it is probable, they derive their origin. In stature, they are tall; their features are strongly marked; their eyes are large and beautiful; their noses, well proportioned; their lips, thin; and their teeth, white. Of the inhabitants of Nubia, on the contrary, their noses are flat; the lips, thick and prominent; and the countenance exceedingly black. These Nubians, as well as the Barberins their western neighbours, are a species of Negroes not unlike those of Senegal.

The Ethiopians are a people between the extremes of barbarism and civilization; their garments are cotton, though those of the more opulent, are silk; their houses are low, and of a bad construction; and their lands are wretchedly neglected. These circumstances are owing to the behaviour of their nobles, who despise the tradesmen and the common people. Each of these classes, however, lives separately, and has its own villages or hamlets. Unprovided with salt, they purchase it from abroad for its weight in gold; and they are so fond of raw meat, that, at their feasts, the second course which is considered the most delicate, consists of it entirely. Though they have vines, they make no wine; and their usual beverage is a sour composition made with tamarinds. They use horses for the purpose of travelling, and mules for carrying their merchandise. Of the arts and sciences they have little knowledge. Their language is without rules; and their manner of writing, though their characters are

more beautiful than those of the Arabians, is so imperfect, that they require several days to write a letter. In their mode of salutation, there is something exceedingly whimsical: each takes the right hand of the other and carries it to his mouth; afterwards, the saluter takes off the scarf of the person saluted, and fastens it round his own body: thus the latter is left half naked, few of the Ethiopians wearing any more than this scarf, and a pair of cotton drawers.

The first Negroes we meet with, are those who live on the south side of Senegal. These people, as well as those who occupy the different territories between Senegal and Gambia, are called *Jalofes*. They are all very black, well proportioned, and of a size sufficiently tall. Their features are less harsh than those of the Negroes; and some of them, especially of the female sex, have features that are far from being irregular. With respect to beauty, they value fine eyes, a well made nose and mouth, and lips of a proportionable smallness. With respect to the ground of the picture, they differ from us; for with them, the colour must be exceedingly black and glossy. Their skin, however, is very delicate and soft; and, colour excepted, we find among them women as handsome as in any other country of the world. They are usually very gay, lively and amorous.

Father du Tertre, says expressly, that, if the Negroes are for the most part flat-nosed, their parents are the sole cause of it. He adds, that they also compress their lips to make them thicker; and that, of the few who have undergone neither of those operations, the features of the countenance are as comely, the nose as prominent, and the lips as delicate as those of the Europeans. It appears, however, that among the Negroes in general, thick lips and a nose broad and flat are the gifts of nature; from which originated the custom of flattening the nose and thickening the lips of those, who at their birth, discovered a deficiency in these ornaments.

Though the Negroes of Guinea are very healthy, they seldom attain, what we term, old age. In his own country, a Negro of fifty, is a very old man; and so early as forty, he manifests all the marks of being so.

Negroes, in general, are remarkably innocent and inoffensive: if properly fed, and not exposed to bad usage, they are contented, joyous, and obliging; and on their very coun-

tenances we may read the satisfaction of their souls. On the contrary, if harshly treated, their spirits forsake them, and they droop with sorrow. Alike impressed with a sense of what injuries and favours they have received, to a cruel master they are implacable foes; but to an indulgent one, they are servants who will exert every effort of which they are capable, to express their zeal and attachment to him. To their children, their friends, and their countrymen, they are naturally compassionate and tender. Content with the little they have, they communicate a share to those who are indigent. That they have an excellent heart, is evident; and in having this, they have the seed of every virtue. Their sufferings demand a tear. Are they not sufficiently unhappy in being reduced to a state of slavery, without reaping the smallest fruits of their labour? But, to crown their wretchedness, they must be abused, buffeted, and treated like brutes. Humanity revolts at a conduct, which nothing but the thirst for gold could ever have inspired; and, of which, every day will produce an aggravated repetition, till an enlightened legislature shall put an end to a traffic which disgraces human nature.

Mr Kolbe, who has given so minute a description of the Hottentots, is strongly of opinion, that they are Negroes: like the latter, he assures us, their hair is short, black, frizzled, and woolly; nor in a single instance did he ever observe it long.

Though, of all the Hottentots, the nose is very flat and broad, yet it would not be of that form, did not their mothers, who consider a prominent nose a deformity, crush it presently after their birth. Their lips are also thick, the upper lip in particular: their teeth are very white; their eye-brows, thick; their heads, large; their bodies, meagre; and their limbs, slender. They seldom live above forty years; and the cause, no doubt, is their residing continually in the midst of filth, and constantly living upon meat that is corrupt. I might dwell longer upon the description of this nasty people; but, as most travellers have given very accurate accounts of them, I shall close it with a fact related by Tavernier. The Dutch, he says, once took a Hottentot girl, soon after her birth; and bringing her up among themselves, she became as white as an European. From

this circumstance he presumes, that all Hottentots would be tolerably white, were it not for the custom of perpetually begriming themselves.

In America, we observe less variety in the human form than might be expected; though it cannot but be supposed, that in such an extensive continent, a considerable diversity may be found.

In this search we find, in the most northern parts, a species of Laplanders similar to those of Europe, or to the Samoeids of Asia; and though, in comparison to the latter, they are few in number, yet extensively diffused. Those who inhabit the land of Davis' Straits, are of a diminutive size, but very strong; their complexion, olive; and their legs, short and thick. They are skilful fishers; they eat their fish and meat raw; and pure water, or the blood of the dog-fish, is their constant drink. Here we see the figure, colour, and manners of the Laplanders. But what is truly singular, as among the Laplanders of Europe we meet with Finlanders who are white, comely, tolerably tall, and well made; so, among the Laplanders of America, we meet with another species of men, tall, well made, tolerably white, and with features exceedingly regular.

Of a different race from the former are the savages of Hudson's Bay, and northward of the land of Labrador. They are ugly, diminutive, and unshapely; and their visages are almost entirely covered with hair, like the savages of the country of Yeco, northward of Japan. In summer, they dwell under tents made of skins of the rein-deer; in winter, they live under ground like the Laplanders and the Samoeids, and sleep together without distinction. They likewise live to a great age, and feed on nothing but raw meat and fish. The savages of Newfoundland have a considerable resemblance to those of Davis' Straits: they are low in stature; have little or no beard; their visages are broad and flat; their eyes, large; they are rather flat-nosed; and, upon the whole, are far from being unlike the savages of the North Continent, and of the environs of Greenland.

Besides the savages scattered over the most northern parts of America, we find great numbers which are entirely different in Canada, and the vast extent of land to

the Assiniboils. These are tolerably tall, robust, vigorous, and well made. They have hair, and eyes black; teeth, very white; complexion, tawny; beard, scanty; and hardly a vestige of hair over the whole body. They are hardy, indefatigable walkers, and very nimble runners; alike unaffected by excesses of hunger, and satiety; are by nature bold, fierce, grave, and sedate; and so strongly do they resemble the Oriental Tartars that, were they not separated from each other by an immense sea, we should conclude them to be descendants of that nation. In point of latitude, their situation is the same, which farther proves the powerful influence of climate not only on the colour but the figure of men.

Mr Fabry, who travelled a prodigious way to the north-west of the Mississippi, and visited places which no European had done before, and of which the savage inhabitants had not been destroyed, has assured me, that that part of America is so deserted, that he often travelled an hundred, and sometimes two hundred leagues, without observing a single human face or the smallest vestige of an habitation. He adds, that whenever he met with any habitations, they were always at immense distances from one another; and that, in each of them, there was frequently not above one family, sometimes there were two or three families, but never above twenty persons together; and between the twenty persons and twenty others, there was generally a space of a hundred leagues.

If, however, in the whole of North America, there were none but savages to be met with; in Mexico and Peru, there are found nations, polished, subject to laws, governed by kings, industrious, acquainted with the arts, and not destitute of religion.

In the present state of those countries, so intermixed are the inhabitants of Mexico and New Spain, that we hardly meet with two visages of the same colour. In the town of Mexico, there are white men from Europe, Indians from the north and south of America, and Negroes from Africa, &c. insomuch, that the colour of the people exhibits every different shade between black and white. The real natives are very brown, or of an olive colour, well made, and extremely active.

In surveying the various appearances which the human form assumes in the different regions of the earth, the most striking circumstance is that of colour; which has been attributed to various causes: but in my opinion, and experience warrants us to affirm, that the heat of the climate is the principal. Where this is excessive, as at Senegal and Guinea, the inhabitants are entirely black; where it is less violent, as on the eastern coasts of Africa, they are of a lighter shade; where it begins to be somewhat more temperate, as in Barbary, India, Arabia, &c. they are only brown; and where it is altogether temperate, as in Europe and Asia, they are white. All the Tartars, for example, are tawny; while the Europeans, who live in the same latitude, are white. Of this difference the reason seems to be, the former are always exposed to the air, have no towns, no fixed habitations; but sleep upon the earth, and live coarsely in every respect. These circumstances are sufficient to render them less white than the Europeans, to whom nothing is wanting which may render life comfortable and agreeable. Why are the Chinese whiter than the Tartars, whom they resemble in all the features of the visage? It is because they are civilized, live in towns, and are provided with every expedient for defending themselves against the injuries of the weather, to which the Tartars are continually exposed.

Where cold becomes extreme, it produces effects similar to those of excessive heat. Either of those extremes occasions a dryness of the skin, which makes the subject of a tawny colour; hence the reason why the Samoeids, Laplanders, and Greenlanders are of this complexion; and it is asserted that, among the Greenlanders, there are men as black as those of Africa.

Cold compresses, shrivels, and reduces within a narrow compass all the productions of nature; thus the Laplanders, who are perpetually exposed to the utmost rigours of it, are the most diminutive of the human species.

The most temperate climate is between the degrees of forty and fifty. There we behold the human form in its greatest perfection; and there we ought to form our ideas of the real and natural colour of man. Situated under this Zone, the civilized countries are, Georgia, Circassia, the

Ukraine, European Turkey, Hungary, South Germany, Italy, Switzerland, France, and the North of Spain. Of the latter, the inhabitants are the most beautiful and shapely in the world.

As difference of climate is the sole cause of the different colours of mankind; so food, which is gross, unwholesome, or badly prepared, has a strong tendency to produce a degeneracy in the human form. Hence, in all countries, where the people fare wretchedly, they are more ugly and deformed than their neighbours.

The air and soil have also great influence, not only on the form of men, but on animals, and vegetables. In comparing the peasants who live on hilly grounds, with those who live imbosomed in the neighbouring valleys, we find, that the former are active, nimble, well shaped, and lively; and the women generally handsome: while the latter, in proportion to the density of air, food, and water, are clumsy and inactive.

From these circumstances we prove, that mankind are not composed of species essentially different from each other: but that there was originally, one individual species which, after being multiplied and diffused over the face of the earth, underwent divers changes from the influence of climate, difference of food, and modes of living: also from epidemical distempers, and the intermixture varied *ad infinitum*, of individuals more or less resembling each other. At first, those alterations were less considerable, and confined to a few; but afterwards from the above causes becoming more general, sensible, and fixed, they formed varieties in the species; which have been, and still are perpetuated from generation to generation, in the same manner as certain deformities and maladies pass from parents to children. In short, as those varieties would never have been produced but by a concurrence of external and accidental causes, as they could never have been confirmed and rendered permanent but by time and the continued action of those causes; so it is highly probable, that they will in like manner gradually disappear, or even become different from what they now are, if such causes were no longer to exist.

BUFFON'S

NATURAL HISTORY.

CHAP. I.

*Of Quadrupeds in General---Of Domestic Animals---The
Horse---The Ass---The Ox---The Sheep---The Goat---
The Swine---The Wild Boar, &c.*

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WHEN we consider the three great classes of animals, quadrupeds, birds, and fishes, with respect to the rank they hold in the scale of being; quadrupeds both from their external structure, their manners, and instincts, are evidently entitled to the place next to Man. Some of the species on a superficial view, and much more when inspected with anatomical accuracy, nearly resemble the human frame. They live like man on the surface of the earth, have many wants in common with him, are gifted with similar means of satisfying them, and almost all their bodily functions are performed on the same plan. They are superior to birds in bringing forth their young alive, to fishes in breathing through their lungs, and to insects in having the sanguiferous vessels filled with red blood.

With the vices and virtues of mankind, Quadrupeds are deeply tinged; in them may be found, the two extremes of virtue and vice, with all the intermediate gradations. What can surpass the fidelity of the dog? or what the ferocity of the wolf and the tyger?

In these instances which come under our view, the forms and instincts of animals are admirably conducive to their gratification. Our decision, therefore, is premature, when we denominate some animals helpless and wretched, because they have not all the advantages which we enjoy; such as the sloth which crawls up a tree in a month, and the mole, almost incapable of vision; as these animals may have sources of pleasure to which we are ignorant.

The heads of Quadrupeds are variously formed, corresponding to their different manner of subsisting: in the porcine species, it is sharp, as their food is chiefly under ground: in the canine, which pursue their prey by scent, it is long, in order to afford room for the olfactory nerves: in others, which are frequently engaged in combat, it is short and strong, as in the lion. Their teeth also are adapted to the nature of their food: in those which live on vegetables, they are edged before, for cropping grass and herbs: in carnivorous animals, the fore teeth are sharp for holding and dividing; and farther in the mouth, they turn broad with unequal, rugged surfaces, to render the aliment fit to assimilate with the fluids in the stomach. Their feet and legs are also adapted to them; those which live on fish have webbed feet; and beasts of prey have claws which they can sheathe or unsheathe at pleasure. The stomachs of Quadrupeds are formed according to their diet; those which eat flesh, have it small and glandular, while those which eat vegetables have it very large. Some animals which chew the cud have four stomachs; but in Africa, where the plants are soft and nutritious, only two.

The number of species in quadrupeds, is usually estimated at 200, the most obvious distinction is, between the domesticated, and those which are yet wild and untamed.





THE HORSE.

THE noblest conquest ever made by man, is that of this spirited and haughty animal, which shares with him the fatigues of war, and the glory of the combat. Equally intrepid as his master, the horse sees the danger, and braves it; he is inspired and animated at the clash of arms, and feels all the ardour of the warrior. He takes pleasure also in the chace, in tournaments, and in the course; he is all fire, but equally tractable as courageous, does not give way to his impetuosity, but knows how to check his inclinations: he not only submits to the arm which guides him, but even seems to consult the desires of his rider; and, always obedient to the impressions which he receives from him, presses on, moves gently, or stops, as his rider pleases. The horse is a creature that renounces his being, to exist only by the will of another, which he knows how to anticipate and execute by the promptitude and exactness of his movements: he feels as much as we desire, does only what we wish, gives himself up without reserve, and refuses nothing, makes use of all his strength, and even dies to obey us.

Such is the horse, the natural qualities of which art has improved. His education commences with the loss of his liber-

ty and by constraint it is finished. The servitude of these creatures is universal, and so ancient that we rarely see them in their natural state. They are never wholly free from all their bands, not even at the time of rest; and if they are sometimes suffered to range at liberty in the fields, they always bear about them the marks of servitude, and too often those of labour and pain. The mouth is deformed by the wrinkles occasioned by the bit, the flanks are scarred with wounds inflicted by the spur, the hoofs are pierced by nails, and the attitude of the body constrained by habitual shackles. Even those the servitude of which is the most gentle, which re fed and broken for luxury and magnificence only, and the golden chains of which serve less to decorate them, than to satisfy the vanity of their master, are still more dishonoured by the elegance of their trappings, by the tresses of their manes, by the gold and silk with which they are covered, than by the iron shoes on their feet.

Nature is more beautiful than art, and in an animated being, the freedom of its movements makes nature beautiful. Observe the horses in Spanish America, that live wild; their gait, their running, or their leaping, seems neither constrained nor regular. Proud of their independence, they fly the presence of man, and disdain his care. They wander about in liberty, in immense meads, where they feed on the fresh productions of an eternal spring. Destitute of any fixed habitation, without any other shelter than a mild sky, they breathe a purer air than those that are confined in vaulted palaces. These wild horses are also much stronger, much swifter, and more nervous than the greater part of domestic horses: they have, what nature has bestowed upon them, strength and nobleness: the others, only what art can give, beauty and cunning.

The natural disposition of these animals is not ferocious, for though superior in strength to the greatest part of animals, they never attack them; and if they are attacked by others, they either disdain them or trample them under their feet. They herd together, as they are not fearful of, but fond of one another. As herbs and vegetables are sufficient for their nourishment, they have quite enough to satisfy their appetite; and as they have no relish for the flesh of animals, they never make war with them, nor with themselves.

They live in peace because their appetite is simple and moderate; and, as they have enough, there is no room for envy.

As all parts of Europe are at present peopled, and almost equally inhabited, wild horses are no longer found there; and those which we see in America, were originally European tame horses, which have multiplied in the vast deserts of that country. The astonishment and fear which the inhabitants of Mexico and Peru expressed at the sight of horses and their riders, convinced the Spaniards that this animal was entirely unknown in these countries: they therefore carried thither a great number as well for service, and their particular utility, as to propagate the breed. M. de la Salle, in 1685, saw in the northern parts of America, near the Bay of St Louis, whole troops of these wild horses feeding in the pastures, which were so fierce that nobody durst approach them. The author of the History of the Adventures of the Buccaneers, says, that in the island of St Domingo, horses may sometimes be seen in troops of upwards of five hundred running together, and that as soon as they see a man, they will stop. He adds, that one of them will approach to a certain distance, snort, take flight, and then all the rest will follow him. To catch them, they make use of nooses made of ropes, these they spread and hang in places which they know they frequent: if they are caught by the neck they strangle themselves, unless the huntsman hasten to their assistance, who instantly secures them by the body and legs, and fastens them to trees, where they are left for two days without either food or drink. This experiment is sufficient to begin their subjection with, and in time, they become as tame as if they had never been wild; and even, if by chance they ever regain their liberty, they know their masters, and suffer themselves to be taken without trouble.

The manners of these animals almost wholly depend on their education. From time immemorial it has been the custom to separate the colts from their mothers after they have suckled them five, six, or seven months; for experience has taught, that those colts which are suckled ten or eleven months, are not of equal value with those which are weaned sooner, though they are generally fuller of flesh. After six or seven months sucking, they are weaned, that they may take more solid nourishment than milk: bran is then given

them twice a day, and a little hay, of which the quantity is increased in proportion as they advance in age, and they are kept in the stable as long as they seem to retain any desire to return to the mare; but when this desire ceases, they are suffered to go out in fine weather, and led to pasture: care however must be taken not to suffer them to go out to pasture fasting: they must have bran, and be made to drink an hour before they are suffered to graze, and are never to be exposed to great cold or rain: in this manner they spend the first winter. In the May following, they are not only permitted to graze every day, but are suffered to lie in the fields all the summer, and even to the end of October, only they must not be allowed to eat the after-grass: for if they accustom themselves much to it, they will grow disgusted with hay, which ought however to be their principal food, during the second winter, together with bran mixed with barley, or oats wetted. They are managed in this manner, letting them graze in the day time during winter, and in the night also during the summer, till they are four years old, when they are taken from the pastures, and fed on hay. This change in food requires some precaution; for the first eight days, the colt should have nothing but straw, and it is proper to administer some vermifuge drinks, as those insects may have been generated from indigestion, and food.

Great attention must be paid in weaning young colts, to put them into a proper stable, not too hot, for fear of rendering them delicate and too sensible to the impressions of the air. They should frequently have fresh litter and be kept very clean, by rubbing them often down with a wisp of straw. But they should not be tied up or curried till they are two years and a half, or three years old; for this gives them great pain, their skin being too tender to bear it, and they would fall away instead of growing fat from it: care must also be taken that the rack and manger are not very high, as the necessity of raising their heads considerably, in order to reach their food, may possibly cause a habit of carrying it in this fashion, which would give them an awkward appearance.

At the age of three years, or three and a half, the rider should begin to break them and make them tractable. They should at first have a light easy saddle, and ought to wear it

two or three hours every day, and they should be accustomed to have a snaffle bit in their mouths, and to lift up their feet, on which they should sometimes receive rather smart strokes, and if designed for coach or draught horses, should wear harness and a bridle. At first a curb should not be used, they should be held by a leather strap, and be made to trot, on even ground, without a rider, and with only the saddle or harness on the body: when the saddle horse turns easily, and willingly follows the person who holds the leather strap, the rough rider should mount and dismount him again in the same place, without making him move, till he is four years old, because before that age, the weight of a man overloads him, but at four he should be made to walk or trot, a little way at a time, with the rider on his back. When a coach horse is accustomed to the harness, he should be paired with a horse that is thoroughly broken, putting on him a bridle, with a strap passed through it, till he begins to be used to the draught; after this, the coachman must teach him to go backwards, having the assistance of a man before, who must push him gently, and even give him some blows to make him do it: all this should be done before young horses have changed their food, for when once they are what is called corn fed, that is, when they feed on grain and hay, as they are more vigorous, it is remarked also that they are less tractable, and more difficult to break.

The bit and the spur are two means made use of to bring them into subjection. The mouth does not appear formed by nature to receive any other impressions than that of taste and appetite, there is, however, so great a sensibility in the mouth of a horse, that in preference to the eyes and ears, we address ourselves to it, to make him understand our pleasure: the smallest motion or pressure of the bit, is sufficient to inform and determine the animal; and this organ of sense has no other fault than its perfection. Its too great sensibility must be managed, for if it is abused, the mouth of the horse is rendered insensible to the impression of the bit; the senses of sight, and hearing are not subject to such a change, and could not be dulled in this manner; but, it has been found inconvenient to govern horses by these organs, and it is generally true, that signs given them by the sense of feeling, have more effect on animals in general

than those conveyed by the eyes or ears: besides, the situation of horses with relation to those who mount or conduct them, makes their eyes almost useless for this purpose, because they see only straight forwards, so that they could only perceive the signs made to them when they turned their heads round; and although they are frequently conducted and animated by the ear, yet in fact, if they are well broken, the smallest pressure of the thighs, or most trifling motion of the bit, is sufficient to direct them: the spur is even useless, or at least it is only made use of to force them to violent motions; and as through the unskilfulness of the rider, it often happens that in giving the spur, he checks the bridle; the horse finding himself excited on one side, and kept in on the other, only prances and capers without stirring out of his place.

By means of the bridle we teach horses to hold up their heads, and place them in a proper manner, and the smallest sign or movement of the rider is sufficient to make the horse shew all his different paces: the most natural is perhaps the trot, but pacing and galloping are more pleasant for the rider, and these are the two paces we particularly endeavour to improve.

Though walking is the slowest of all their paces, a horse should, notwithstanding, step quick, and neither take too long nor too short steps: his carriage should be easy, this ease depends much on the liberty of his shoulders, and is known by the manner in which he carries his head in walking, if he keep it high and steady, he is generally vigorous, quick, and free in his motions. When the motion of the shoulders is not free, the leg does not rise enough, and the horse is apt to stumble, and strike his foot against the inequalities of the ground: when, on the other hand, the shoulders are more confined in their action, and the motion of the legs appears free, the horse is soon fatigued, stumbles, and becomes useless. A horse should raise his shoulders, and his lower haunches in walking: he should also support his leg, and raise it high enough, but if he keeps it up too long, or lets it fall too slowly, he loses all the advantage of his suppleness, and becomes quite heavy.

It is not sufficient that his walk should be easy, his steps must be also equal and uniform both behind and before, for

if his buttocks have a swinging motion, while he keeps up his shoulders, the rider is much jolted. The same thing happens when the horse extends his hind leg too much, and rests it almost in the same place in which he rested his fore foot. Horses with short bodies are subject to this fault: those which cross their legs or strike them against each other, are not sure footed. But those with long bodies are the most easy for the rider, because he is at a greater distance from the two centres of motion, the shoulders and haunches, and is therefore less sensible of the motion and jolting.

The usual method of walking among quadrupeds, is to lift up at the same time one of the fore and one of the hind legs while the right fore leg is in motion, the left hind leg follows and advances at the same time, and this step being made, the left fore leg conjointly with the right hind leg in its turn, and so on. As their bodies are supported upon four points which form a long square, the easiest manner of moving for them, is to change two of them at once in a diagonal line, in such a manner, that the centre of gravity of the body of the animal, may move but little, and rest always in the direction of the two points which are not in motion. In the three natural paces of the horse, the walk, the trot, and the gallop, this rule of motion is always observed, but with some difference: in the walk, there are four times in the movement; if the right fore leg moves first, the left hind leg follows the moment after, then the left fore leg moves forward in turn, to be followed the instant after by the right hind leg. Thus the right fore foot rests on the ground first, the left hind foot next, then the left fore foot rests, and lastly, the right hind foot, which makes a movement of four times, and at three intervals, of which, the first and last are shorter than the middle one. In the trot there are but two times in the movement; if the right fore leg goes off first, the left hind leg moves at the same time, and without any intervals between the motion of the one, and the motion of the other. The left fore leg moves also at the same time with the right hind one.

In the gallop there is usually three times; but as in this movement there is a kind of leaping, the interior parts of

the horse do not move off themselves, but are driven away by the strength of the haunches and the hinder parts. Thus, of the two fore legs, the right ought to advance more forward than the left. The left ought before hand to rest on the ground to serve as a point of rest for the sudden jerk which he takes. Hence the left hind foot makes the first time of the movement, and rests on the ground first; then the right hind leg is lifted up conjointly with the left fore leg, and rest on the ground together. At length, the right fore leg, which is raised an instant after the left fore leg, and right hind one, rests on the ground last, which makes the third time. Thus, in this movement of the gallop, there are three times and two intervals; and in the first of these intervals, when the movement is made with haste, there is an instant when the four legs are in the air at the same time, and when the four shoes of the horse may be seen at once. When the horse has the haunches and the houghs supple and moves them with agility, the movement of the gallop is more perfect, and the cadence is made in four times. He then rests the left hind foot which shews the first time. When the right hind foot falls to the ground and shews the second time. The left fore foot falls a moment after, shewing the third time; and at length the right fore foot, which rests last, shews the fourth time.

Horses usually gallop on the right foot, in the same manner as they carry the fore right leg in walking and trotting. They also throw up the dirt in galloping with the right fore leg, which is more advanced than the left. The right hind leg which follows immediately the right fore one, is more advanced than the left hind leg, the whole time the horse continues to gallop. Hence the left leg which supports all the weight, and which forces forward the others, is more tired; for this reason it would be right to exercise horses in galloping alternately on the left foot, as well as on the right; and consequently they would bear much longer this violent motion.

In walking, the legs of the horse are lifted up only a small height, and the feet almost scrape the ground. In trotting they are raised higher, and the feet are entirely free from the ground. In galloping the legs are lifted up still higher, and the feet seem to rebound from the earth. The walk to

be good should be quick, easy, light, and sure. The trot should be firm, quick, and equally sustained. In this place, the horse should carry his head high, and his back straight; for, if the haunches rise and fall alternately at each trot he takes, if the crupper moves up and down, and the horse rocks himself, he trots ill. If he throws out his fore legs it is another fault: the fore legs should tread in a line with the hind ones, which should always efface their tracts. When one of the hind legs is thrown forwards, if the fore leg of the same side remains in its place too long, the motion becomes more uneasy and difficult from this resistance. For this reason the interval between the two times of the trot should be short; but, be it ever so short, this resistance is sufficient to make this pace more uneasy than either walking or galloping, because in walking the motion is more easy, gentle, and the resistance less; and in galloping there is scarcely any horizontal resistance, which is the only one inconvenient to the rider.

Walking, trotting, and galloping, are the most natural paces of the horse. Some, however, have another called the amble, which is very different from the former, and, at the first glance appears contrary to the laws of mechanics. In this pace the foot of the horse grazes the ground still more than in walking, and each step is much longer. But the most remarkable circumstance is, that the two legs on the same side, set off at the same time to make a step, and afterwards the two other legs move at the same time to make another, so that each side of the body alternately is without support, and there is no equilibrium maintained between the one or the other. It is therefore only from his almost grazing the earth, and the quick alternate motion, that he can support himself in this pace. There is in the amble, as well as in the trot, but two times in the motion; and all the difference is, that in the trot the two legs which go together are opposite, in a diagonal line; instead of which, in the amble, the legs on the same side go together. This pace, is very easy for the rider, as it has not the jolting of the trot, which is occasioned from the resistance the fore leg meets with when the hind leg rises. Because in the amble, the fore leg rises at the same time with the hind leg on the same side: instead of which, in

trotting the fore leg on the same side, rests and assists the impulse the whole time the hind leg is in motion.

Of all large animals, the horse has the greatest proportion and elegance in every part of his body. The great length of the jaws, is the principal cause of the difference between the heads of quadrupeds, and those of the human species. It is also, the most ignoble mark of all; yet, though the jaws of the horse are very long, he has not, like the ass, an air of imbecility, or of stupidity like the ox. The regularity of the proportions of his head, on the contrary, gives him an air of sprightliness, which is well supported by the beauty of his chest. The horse seems desirous of raising himself above the state of a quadruped, by holding up his head, and in this noble attitude he looks man in the face. His eyes are lively and large, his ears well made, and of a just proportion, without being short like those of the bull, or too long like those of the ass. His mane graces his head, ornaments his neck, and gives him an air of superiority. His long bushy tail covers, and terminates advantageously the extremities of his body, far different from the short tails of the stag, the elephant, &c. and the naked tails of the ass, the camel, the rhinoceros, &c. The tail of the horse is formed of long, thick hair, which seems to come from his rump. He cannot raise his tail like the lion, but it suits him better hanging down, as he can move it sideways. It is very useful to him to drive away the flies which incommode him, for though his skin is very hard, and every where furnished with a close thick coat it is extremely sensible.

The head of a well proportioned horse should be lean and small, without being too long. The ears should be at a moderate distance, small, straight, immoveable, narrow, thin and well placed on the top of the head. The forehead should be narrow, and a little convex. Hollows should be filled up, the eye-lids thin, the eyes clear, lively, full of fire, rather large, and projecting from the head, the pupil large, the nether jaw thin, the nose a little aquiline, the nostrils large and open, the partition of the nose, and the lips thin. The mouth ought to be of a moderate width, the withers raised and sloping, the shoulders thin, flat, and not confined, the back equal, even, and insensibly arched lengthways, and raised on each side of the spine, which should appear indent-

ed. Flanks should be full and short, the rump round and fleshy, the haunches well covered with hair, the stump of the tail thick and firm, the fore legs and thighs thick and fleshy, the knees round before, the houghs large and rounded, the sinews loose, the joints next the feet small, the fetlock thinly covered with hair. The pastern ought to be large, and of a midling length, the coronet rather raised, the hoof black, smooth, shining, and high, the quarters round, the heels wide and moderately raised, the frog small and thin, and the sole thick and hollow.

But there are few horses in which this assemblage of perfections is to be found. The eyes are subject to many complaints, which are not easily understood. In a healthy eye, we ought to see through the cornea two or three spots of the colour of soot above the pupil. To see these spots, the cornea must be clear, clean, and transparent; if it appears double, or of a bad colour, the eye is not good. A small, long, and straight pupil, encompassed with a white circle, is also a bad sign; and when it is of a blueish-green colour, the eye is certainly bad and the sight dull.

It is very easy to form a judgment of the natural and actual state of this animal by the motion of his ears: when he walks, he should project forwards the points of his ears: a jaded horse carries his ears low; those which are spirited and mischievous, alternately carry one of their ears forwards and the other backwards: they all carry their ears on that side from whence they hear a noise, and when any one strikes them on the back, or on the rump, they turn their ears back. Horses which have their eyes deep sunk in the head, or one smaller than the other, have usually bad sight: those which have the mouth dry, are not of so healthy a temperament as those which have the mouth moist, and make the bridle frothy. A saddle horse ought to have his shoulders flat, moveable, and not very fleshy; the draught horse, on the contrary, should have them flat, round, and brawny: if, notwithstanding, the shoulders of a saddle horse are too thin, and the bones shew themselves through the skin, it is a proof they are not free, and consequently the horse cannot bear fatigue. Another fault of a saddle horse is, when the chest projects too far forward, and the fore legs drawn too much back, because he is apt to rest

on the hand in galloping, and even to stumble and fall. The length of the legs should be proportionate to the height of the horse; when the fore legs are too long he is not sure footed, if they are too short, he is too heavy in the hand. It is a remark that mares are more liable than horses to be short-legged, and that the legs of horses in general are thicker than those of mares and geldings.

One of the most important things to be known, is the age of the horse, which is best discovered from his teeth, of which he has forty, viz. twenty-four grinders, four eye teeth, and twelve incisive teeth; mares have no eye teeth, or if they have, they are very short: the grinders are not instrumental to this knowledge, we form our judgment from the front and eye teeth. The twelve front teeth begin to shew themselves fifteen days after the birth of the foal, these first teeth are round, short, weak, and drop out at different periods in order to make room for others: at two years and a half the four front middle teeth drop out the first, two at top and two at bottom; a year after four others fall out, one on each side of those which are already replaced: at about four years and a half, four others drop out, always on the side of those which have been replaced, these four last milk teeth are replaced by four others, which do not grow near so fast as these which replaced the first eight; and the four last teeth which are called the wedges, and which replace the four last milk teeth, are those by which we know the age of a horse. These are easily known, since they are the third as well at top as at bottom, beginning to count from the middle of the extremity of the jaw: these teeth are hollow and have a black mark in their concavity: at four and a half, or five years old, they scarcely project beyond the gums, and the hollow is plainly seen: at six and a half it begins to fill up, the mark also begins to diminish and grow narrower, and so continues till seven and a half or eight years, when the hollow is entirely filled up and the black mark effaced: after the animal has attained eight years, these teeth do not give any further information respecting age, we then have recourse to the eye teeth or tusks: these four teeth are placed at the side of those which have just been mentioned. The eye teeth, as well as the grinders, are not preceded by others which fall out, those of the infe-

rior jaw usually come out first at three years and a half, and those of the upper jaw at four which till they are six years old are very sharp: at ten the upper ones appear already blunt, worn and long, because they are bare, the gum wearing away with age, and the more they are worn away the more aged the horse is: from ten till thirteen or fourteen years, there is hardly any indication of the age, except some hairs on the eye-brows which begin to grow white; but this is equivocal, since it has been remarked, that horses engendered from old stallions and old mares have the hair white on the eye brows at ten years old. There are also horses the teeth of which are so hard that they do not wear, and upon which the black mark subsists, and is never effaced; and others which have the mark in their mouth as long as they live. We may also know, though with less precision, the age of a horse by the ridges of the palate, which are effaced in proportion to his age.

It has been remarked, that studs kept in dry and light countries produce good tempered, swift, and vigorous horses with nervous legs and hard hoofs; while on the other hand those which are bred in damp places, and in fat pasturage, have generally the head large and heavy, the legs thick, the hoofs soft, and the feet flat. This difference arises from the climate and food, but what is more difficult to be accounted for, and still more essential than any thing that has been said, is the necessity of always crossing or mixing the breed, if we would prevent degeneration.

Mares usually go with foal eleven months and some days; they breed commonly till the age of fourteen or fifteen years and the more vigorous till they are above eighteen.

The duration of the life of horses, is like that of every other species, which is in proportion to the length of the time of their growth. Man, who is above fourteen years in growing, lives six or seven times as long, that is ninety or a hundred years. The horse, which attains his full growth in four years, lives six or seven times as long, that is twenty-five or thirty years. There are so few examples to contradict this rule, that we should not even regard them as exceptions from whence we may draw any precedents. It is worthy of remark too, that as robust horses arrive at their

full growth in less time than delicate ones, they also live less time, and at fifteen years of age become old.

The Arabian horses are, as far as we know, the handsomest in Europe, they are larger and plumper than those of Barbary, and equally well-shaped, but as they are not often brought into this country, riding-masters are not able to give an exact account of their perfections and defects.

The horses of Barbary are more common; they are frequently negligent in their paces, and must be often reminded: they are very swift and strong, light, and fit for hunting. These horses seem the most proper to breed from: it were only to be wished that they were larger, as they seldom exceed four feet eight inches high.

The Turkish horses are not so well proportioned as those of Barbary: they will, however, travel a great way, and are long winded; this is not surprising, if we consider, that in warm countries, the bones of animals are harder than those in cold climates; hence the reason of their being stronger in the legs.

The Spanish horses are second in rank to those of Barbary: those of a handsome breed are plump, well-coated, and low: their movements are likewise quick and supple, and they are remarkable for spirit and boldness. Their hair is usually black, or of a bay chesnut colour, though there are some of various colours, and it is but seldom that they have white legs and noses. The Spaniards, who have an aversion to these marks, never breed from horses that have them, chusing only a star in their forehead.

The handsomest English horses have in their conformation great resemblance to those of Arabia and Barbary, from which they originally sprung: they are frequently five feet high, and above: they are of different colours, and have all kinds of marks; they are generally strong, vigorous, bold, capable of great fatigue, and excellent for hunting and coursing.

The horses of Italy were formerly much handsomer than at present, because the breed for some time has been neglected; notwithstanding there are still some handsome Neapolitan horses, especially draught ones; but, in general, they have the head large, and the chest thick. They are untractable, and consequently, not easily managed; but

these defects are compensated by their noble form, their stateliness, and the beauty of their motions.

The Danish horses are so handsome in their form, and so beautiful in their coats, that they are preferred to all others for carriages: they are of all colours, and even of some singular ones, as pied. Horses spotted like tigers are found no where but in Denmark.

In Germany we meet with very handsome horses; but they are generally heavy and short-breathed. The Hussars and Hungarians split their nostrils, in order, as they say, to give them more breath, and also to hinder their neighing in battle. The Flemish horses are greatly inferior to those of Holland: almost all of them have large heads, flat feet, and are subject to humours in the eyes; the two last of which are considerable defects in coach-horses.

According to Marmol, the Arabian horses are the offspring of the wild horses of the deserts of Arabia, large studs of which were formed in ancient times, and are now so numerous, that all Asia and Africa are full of them. The Arabians of the desert, and the people of Lybia, breed a great number of these horses for hunting, but they neither use them in travelling nor in their wars; they send them to pasture whilst there is grass for them, and when that fails, they feed them with dates and camel's milk, which make them nervous, nimble and lean, so that some of them will outstrip the very ostriches in their course. They lay snares for the wild horses, and eat the flesh of the young ones, which they affirm is very delicate food. These wild horses are smaller than the tame ones, and are commonly ash-coloured, though there are also some white ones: the mane and hair of the tail is short and frizzled.

Let an Arabian be ever so poor, he has horses. They usually mount the mares, experience having taught them that they bear fatigue, hunger, and thirst, better than the horses. The Turks, on the contrary, do not approve of mares; and the Arabians sell them the horses they do not keep for stallions. They have long and with great care preserved the breed of their horses; they know their genealogy, and distinguish the breeds by different names. The lowest price for a mare of the first class, is from one hundred,

to two or three hundred pounds sterling. As the Arabians have only a tent for their house, it serves them also for a stable. The mare, colt, husband, wife and children, lie promiscuously together; and the little children will lie on the body and neck of the mare and colt, without the least injury. These mares are so accustomed to live in this familiar manner, that they will suffer any kind of play. The Arabians treat them kindly, talk, reason with, and take great care of them, always let them walk, and never use the spur without necessity. Hence, as soon as they feel their flank tickled with the stirrup-iron, they set off immediately with incredible swiftness, and leap hedges and ditches, with great agility: if their rider happens to fall, they are so well trained, that they will stop short even in the most rapid gallop. All Arabian horses are of a middling size, very easy in their manner, and rather thin than fat. They are regularly dressed morning and evening with so much care, that not the smallest spot is left on their skins: their legs, mane, and tail, are also washed, which they let grow and seldom comb, to avoid breaking the hairs. They have nothing given them to eat all day, and seldom are allowed to drink above two or three times. At sunset a bag is fastened round their heads, in which is about half a bushel of very clean barley. These horses, therefore, eat only during the night; and the bag is not taken from them till the next morning, when all is eaten up; and, in the month of March, when the grass is tolerably high, they are turned out to pasture. As soon as the spring is past, they are taken again from pasture, and have neither grass nor oats all the rest of the year, and straw but seldom, barley being their only food. They cut the manes of the colts as soon as they are a year or eighteen months old, in order to make them grow thick and long. They mount them at two years old, or two and a half at most: till this age they put neither saddle nor bridle on them; but after it, all the Arabian horses stand saddled at the doors of their tents, every day, from morning to night.

The breed of these horses is dispersed in Barbary, among the Moors, and even among the Negroes of the river Gambia and Senegal: the principal people of the country have some which are of uncommon beauty. Instead of barley or oats, they give them maize reduced to flour, which they

mix with milk, when they are inclined to fatten them; and in this hot climate they seldom let them drink.

The Tartars live with their horses nearly in the same manner as the Arabians do. When they are about seven or eight months old, the young children mount them, and make them walk and gallop a little way by turns: they thus break them by degrees, and oblige them to submit to long fasting; but they never mount them for racing or hunting till they are six or seven years old, and then make them undergo incredible fatigue, such as travelling two or three days together without stopping, passing four or five without any other food than a handful of grass every eight hours: they also inure them to go twenty-four hours without drinking. These horses, which appear, and which are actually robust in their own country, soon become enfeebled and good for nothing, when transported to China or the Indies; but they succeed better in Persia and Turkey. In lesser Tartary they have also a breed of small horses, which are in such estimation, that they are not allowed to sell them to foreigners. These horses have all the good and bad qualities of those in great Tartary, which shew how much the same manners, and the same education, give the same disposition to these animals. There are also in Circassia, and in Mingrelia, many horses which are even handsomer than those of Tartary. There are also some beautiful horses found in the Ukraine, Walachia, Poland and Sweden; but we have no particular account of their qualities and defects.

When the horse is inflamed with love, desire or appetite, he shews his teeth, and seems to laugh: he also shews them when he is angry, and would bite: he sometimes puts out his tongue to lick, but less frequently than the ox, who licks much more than the horse, and who, notwithstanding, is less sensible to caresses.

The horse also remembers ill treatment much longer than the ox; his natural disposition and courage are such, that, when he finds more is expected from him than he is able to perform, he is irritated and will not endeavour. Instead of which, the ox, who is slow and idle, exerts himself, and is more easily tired.

The horse sleeps much less than man; for when he is in health, he does not rest more than two or three hours toge-

ther: he then gets up to eat; and when he is satisfied, lies down a second time; but does not sleep more than three or four hours in twenty-four. There are even some horses who never lie down, but sleep standing. It has also been remarked, that geldings sleep oftener and longer than horses.

Quadrupeds do not all drink in the same manner, though they are all equally obliged to seek with the head for liquor, except the monkey, macaw, and some others that have hands, and consequently drink like men, when a vase or glass is given them which they can hold: they carry this to their mouths, inclining the head, throwing down the liquor, and swallowing it by the simple motion of deglutition. Man usually drinks in the same manner, because it is most convenient. Quadrupeds also chuse that mode which is most agreeable to them, and constantly follow it. The dog, the mouth of which is large, his tongue long and thin, drinks by lapping, which mode he prefers to that of wetting his nose. The horse, on the contrary, has a small mouth, and his tongue being thick and short cannot scoop it up, he dips his mouth and nose quickly and deeply into the water, which he swallows largely by the simple motion of deglutition: this however forces him to drink without breathing; whilst the dog breathes at his ease during the time he is drinking. Horses therefore should be suffered to take several draughts, especially after running, when respiration is short and quick. They should not however drink the water too cold, because that, independently of the cholic which cold water frequently occasions, it sometimes happens also, from the necessity they are in of dipping the nose into the water, that they catch cold, which often lays the foundation of a disorder called the glanders, the most formidable of all to the horse. As the seat of the glanders is in the pituitary membrane, it is consequently a real cold, which occasions an inflammation in this membrane. Travellers who give us a detail of the maladies of horses in warm climates, as in Arabia, Persia, and Barbary, do not say that the glanders are so frequent there as in cold climates. It is from this therefore that the conjecture arises, that this malady is occasioned by the coldness of the water, because these animals are obliged to dip and keep the nose and nostrils a considerable time under it: this, however, might be prevented by never giving it to them

cold, and by always wiping the nostrils after drinking. Asses which fear the cold more than horses, and resemble them so strongly in the interior structure, are notwithstanding, not subject to the glanders: this may possibly happen from their drinking in a different manner from horses; for, instead of dipping the mouth and nose deeply into the water, they scarcely touch it with their lips.

I shall not speak of the other diseases of the horse; as it would extend this Natural History of him to an unusual length: nevertheless I cannot leave it without regretting that the health of this useful animal should have been hitherto abandoned to the care, and too frequently absurd practice, of ignorant people. The branch of physic which the ancients called Veterinarian, is at present scarcely known but by name. Were some physician to direct his views this way, and make this study his principal object, he would soon find it answer his purpose, both with respect to reputation and profit. Instead of degrading himself, he would render his name illustrious; and this branch of physic would not be so conjectural and difficult as others. All causes being more simple in animals than in man, the diseases are less complicated, and consequently treated with more success. Without mentioning the entire liberty he would have of making experiments and finding out new remedies, and the ability of arriving without fear or reproach at a great extent of knowledge of this kind, from which, by analogy, inferences might be drawn very salutary even to mankind.





THE ASS.

If we consider this animal with attention, he appears only to be a horse degenerated. The perfect similitude in the conformation of the brain, the lungs, the stomach, the intestinal conduit, the heart, the liver, and other viscera, and the great resemblance of the body, legs, feet, and the entire skeleton, is a sufficient foundation for this opinion. We may even attribute the slight differences which are found between these two animals, to the influence of the climate, food, and the fortuitous succession of many generations of small wild horses, half degenerated, which by degrees, have still continued to degenerate so far as at last to produce a new and fixed species; or rather, a succession of individuals, all vitiated in the same manner. What appears to favour this notion, is, that as horses vary much more than asses in the colour of their skin, they are consequently more anciently domestic, since all of this description vary much more in their colour than wild ones of the same species. Besides, the greater number of wild horses, of which travellers speak, are small in their size, and have, like asses, the coat grey, and the tail naked and frizzled at the end. They also mention wild horses, and even domestic ones, which have a black stripe on the back, and other marks, nearly resembling wild and domestic asses.

Again, if we consider the difference of the temperament, disposition, manners, and organism of these two animals, and, above all, the impossibility of mixing the breed to make one common species, or even an intermediate species which may be renewed, it appears a better founded opinion to think that these animals are of a species equally ancient, and originally as different as they are at present. The ass differs materially from the horse, in the smallness of his size, largeness of his head, length of his ears, hardness of his skin, nakedness of his tail, the form of his rump, and also in the dimensions of the neighbouring parts; such as the voice, the appetite, manner of drinking, &c. Do the horse and the ass, then, come originally from the same stock? are they of the same family, or not? and have they not always been different animals?

When two individuals cannot produce together, we can no otherwise account for it, but from a slight difference in their temperament, or some accidental fault in the organs of generation, of one or other of these two individuals. That two individuals of different species, should produce other individuals which do not resemble the one or other in any fixed particular, and can consequently produce nothing like themselves, there needs but a certain degree of conformity between the form of the body and the organs of generation of these different animals. But what an immense number of combinations are necessary, even to suppose that two animals, male and female, of a certain species, are no longer able to produce with those of their own kind, but are even degenerated to such a degree that they can only produce together; and also what a number of combinations are necessary, that the production of these two degenerate animals should follow exactly the same laws which are observed in the production of perfect animals; for a degenerate animal is itself a vitiated production; and how can a vitiated, depraved origin, become a stock, and not only produce a constant succession of beings, but even produce them in the same manner, and following the same laws, which in effect reproduce the animal, the origin of which is pure?

Although we cannot demonstrate that the production of a species, by degeneration, is a thing impossible in nature, yet the number of probabilities on the contrary is so great, that

we can no longer doubt it. For if some species have been produced by the degeneration of others, if the species of the ass is derived from the species of the horse, this can only have happened successively. By degrees, therefore, there would have been, between the horse and the ass, a great number of intermediate animals, the first of which would have differed but slightly in its nature from the horse, and the latter would have approached by degrees to that of the ass. Why then do we not see the representatives, the descendants of the intermediate species? Why do only the two extremes remain?

The ass is then an ass, and not a horse degenerated. He is neither a stranger, an intruder, nor a bastard. He has, his family, his species, and his rank. His blood is pure; and although his nobility is less illustrious, yet it is equally good, equally ancient with that of the horse. Why then, have we so much contempt for this animal; so good, patient, steady, and useful? Why do men carry their contempt even to animals, which serve them so well, and at so small an expence? We take care of, we instruct, and we exercise the horse, while the ass is abandoned to the care of the lowest servant, or the tricks of children. Thus instead of improving, he must loose by this neglect; and if there were not a fund of good qualities, he would certainly lose them by the manner in which he is treated. He is the May game of the rusticks, who beat him with staves, overload him, and make him work beyond his natural strength. We do not consider, that he would be the most beautiful, the best formed and most distinguished of the lower animals, if there were no horses in the world. We forget that he is an ass, that he has all the qualities of his nature, all the gifts attached to his species; and at the same time, we only think of the figure and qualities of the horse, which he ought not to have.

He is naturally as humble, patient, and quiet, as the horse is proud, ardent, and impetuous. He suffers with constancy, and perhaps with courage, chastisement, and blows. He is moderate both as to the quantity and quality of his food. He is contented with the hardest and most disagreeable herbs, which the horse, and other animals, will leave with disdain. He is very delicate with respect to his water, for he will drink none but the clearest, and from rivulets which he is acquaint-

ed with. He drinks as moderately as he eats, and does not put his nose into the water (through fear, as some say, of the shadow of his ears.) As no care is taken to curry-comb him, he frequently rolls himself on the grass, thistles, and in the dust; and, without regarding his load, lays himself down to roll as often as he can, by which conduct he seems to reproach his master, for the little care he takes of him.

When young he is sprightly, and even handsome, light and genteel; but, either from age or bad treatment, he soon loses his beauty, and becomes slow, indocile and headstrong. Pliny assures us, that when they separate the mother from the young one, she will even go through fire to recover it. The ass manifests strong attachment to his master, notwithstanding he is usually ill-treated: he can smell him afar off, and distinguish him from all other men. He also knows the places where he has lived, and the ways he has frequented. His eyes are good, and his smell acute. His ears are excellent, which has contributed to his being numbered among timid animals, the hearing of which, it is pretended is extremely delicate. When he is overloaded, he shews it by lowering his head, and bending down his ears: when he is greatly abused, he opens his mouth, and draws back his lips in a most disagreeable manner, which gives him an air of derision and scorn. If his eyes are covered over he remains motionless. He walks, trots, and gallops like the horse; but all his motions are smaller, and much slower; notwithstanding he can run with tolerable swiftness, can gallop but a little way, and whatever paces he uses, if hard pressed, is soon fatigued.

The Jack-ass brays in a very discordant manner. The she-ass has a more clear and shrill voice, and such as are gelt bray very low; though they seem to make the same efforts, and the same motions of the throat, yet they cannot be heard at a great distance.

Of all animals covered with hair, the ass is least subject to vermin. This circumstance may be attributed to the hardness and dryness of his skin, which is considerably harder than that of most quadrupeds. He is much less sensible than the horse to the whip and the stings of flies.

At two years and a half old, the first middle incisive teeth fall out, and afterwards the other incisive, which are renewed at the same time and in the same order as those of the horse. The age of the ass is also known by his teeth. The third incisive on each side ascertains it, as in the horse.

The ass is three or four years in growing, and lives to the age of twenty-five or thirty. He sleeps less than the horse, and never lies down to sleep, except when quite tired.

There are among asses as among horses, different races; but they are less known, as they have not been reared with the same attention; and we cannot doubt but that they all came (originally) from warm climates. Aristotle assures us, that there were none in his time in Scythia, nor in the other neighbouring countries, not even in Gaul, which, he says, is a cold climate. He adds too, that a cold climate either prevents them from procreating their species, or causes them to degenerate; and that this last circumstance is the reason why they are small and weak in Illyria, Thrace and Epirus. They appear to have come originally from Arabia, and to have passed from thence into Egypt, from Egypt into Greece, from Greece into Italy, from Italy into France, and afterwards into Germany, England, and lastly into Sweden &c. for they are, in fact, weak and small in proportion to the coldness of the climate.

The Latins, after the Greeks, have called the wild ass, *anagra*, which animal must not be confounded, as some naturalists and many travellers have done, with the zebra. The *anagra*, or wild ass, is not striped like the zebra, and is not near so elegant in figure. Wild asses are found in some of the islands of the Archipelago, and particularly in that of Cerigo. There are also many in the deserts of Lybia and Numidia. They are grey, and run so fast, that the horses of Barbary only outstrip them in the chace. When they see a man, they give a loud cry, turn themselves about, and stop, and do not attempt to fly till he approaches pretty near them. They are taken in snares made with ropes, and go in troops both to pasturage and to drink; their flesh is also eaten. There were also, in the time of Marmol, wild asses in the island of Sardinia, but less than those of Africa; and Pietro della Valle says, he has seen a wild ass at Bassora, the

figure of which differed in no respect from a domestic one, except in his colour which was lighter, and had from the head to the tail, a stripe of white; he was also much livelier, and lighter in hunting, than the greater number of asses.

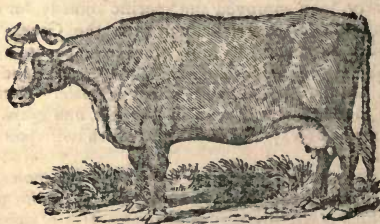
Neither asses nor horses have been found in America, although the climate, especially of North America, is as good for them as any. Those which the Spaniards have transported from Europe, and left in the West Indies, and on the Continent, have greatly multiplied; and in some parts wild asses are found in troops, and are taken in snares like wild horses.

The ass with the mare produces large mules, and the horse with the she-ass produces small mules, differing from the first in many respects.

As wild asses are unknown in these climates, we cannot actually say whether the flesh is good to eat or not; but it is certain that the flesh of the domestic ass is extremely bad, and harder than that of the horse. The milk of the ass, on the contrary, is an approved and specific remedy for certain complaints, and its use is known from the Greeks to us. That it may be good in its kind, we should choose a young healthy she-ass, full of flesh, that has lately foaled, and which has not since that period been with the male. Care must be taken to feed her well with hay, wheat, and grass. The milk must not be exposed to the air, which will spoil it in a short time.

The skin of the ass is used for different purposes, such as to make drums, shoes, and thick parchment for pocket-books, which is slightly varnished over. It is of these skins that the Orientals make the *sagri*, which we call shagreen.

The ass, is perhaps an animal, which for its size, can carry the greatest weight. It costs little to feed him, and as he scarcely requires any care, he is of great use in the country. He also is serviceable to ride on, as all his paces are gentle, and he is less subject to stumble than the horse. He is frequently put to the plough in countries where the earth is light, and his dung is accounted excellent manure.

THE BULL.THE COW.

THE ox, * and other herbivorous animals are not only the most useful to man, but they are also maintained at a small expence. The ox is the most excellent in this respect, as he restores as much to the earth as he takes from it, and even enriches the ground on which he feeds.

That the ox is not so proper as the horse, the ass, or the camel for carrying burthens, the form of his back and loins,

* The word ox, in its common acceptation, denotes Black Cattle in general without regard to sex. In a more restricted sense, it signifies a castrated Bull.

is a demonstration. But the thickness of his neck, and the breadth of his shoulders point him out as an animal proper for the yoke.

In some places they make him draw by the horns. In support of this practice, it is alledged, that when yoked in this manner he is more easily managed. His head is very strong, and he draws well by the horns, but with much less advantage than by the shoulders. Nature seems to have destined him for the plough. The size of his body, the slowness of his motions, the shortness of his legs, and even his tranquillity and patience when he labours, seem to concur in rendering him proper for the cultivation of the fields, and more capable than any other of overcoming the constant resistance he meets with from the earth.

In those species of animals, which man has formed into flocks, and where the multiplication is the principal object, the female is more useful than the male. The produce of the cow is constantly renewed. The flesh of the calf is wholesome and delicate. The milk is the food of children; butter relishes the most of our dishes, and cheese is the common food of the peasants.

The cow arrives at the age of puberty in eighteen months, and the bull in two years. But they should not be admitted to each other till they are three years old. From three to nine years these animals are in their greatest vigour. After this, neither cows nor bulls are fit for any thing but to fatten for the slaughter, as at two years of age they are almost at their full growth. The length of their lives is almost like that of the greatest part of the other species of animals, about fourteen years, and they seldom live above fifteen.

The dullest and most idle animals are not those which sleep the soundest, or the longest. The ox sleeps, but his sleep is short and not very sound; for he wakes at the least noise. He usually lies on his left side, and that kidney is always larger and fatter than the kidney on the right.

Oxen like other domestic animals, differ in colour; but at the same time red appears to be the most common, and the redder they are, the more they are esteemed. It is said, that oxen of a bay colour last longest; that those of a brown colour are sooner fatigued, and shorter lived; that the grey, brindled, and white, are not proper for work, but only

to be fatted for slaughter. Whatever colour the coat of the ox is of, it should be shining, thick, and soft to the touch; for if it is rough and uneven, we have reason to think that the animal is not well, or at least, that he is not of a strong constitution.

The ox should only work about seven years, viz from three to ten; and then to be taken from the plough, in order to fatten him, as the flesh will be better now than if he were kept longer. The age of this animal is known by his teeth and horns. The first front teeth fall out when he is ten months old, and are replaced by others which are larger and not so white. At sixteen months those on each side of the middle teeth drop out, and are replaced by others; and at three years old, all the incisive teeth are renewed. They are then all long, white and even; and, in proportion as the ox advances in years, they decay, and become unequal and black. The horns fall off at three years, and these are replaced by others, which like the second teeth do not fall off a second time. The horns of the ox and the cow grow larger and longer than those of the bull; but the growth of these is not so uniform as the first. At the fourth year of the ox, two little pointed horns sprout, which are even, and terminate at the head by a kind of knob. The following year this knob grows from the head, pushed out by a cylinder of horn, which forms and is terminated by another knob; for as long as the animal lives, the horns grow. These knobs become annular knobs, which are easily distinguished in the horns, and by which the age may be easily known.

The horse eats night and day, slowly, but almost continually. The ox, on the contrary, eats quick, and takes in a short time all the food which he requires after which he ceases to eat, and lies down to ruminate. This difference arises from the different conformation of the stomachs of these animals. The ox, the two first stomachs of which form but one bag of a vast capacity, can receive grass, into both of them at the same time which it afterwards ruminates on, and digests at leisure. The horse, whose stomach is small, and can receive but a small quantity of grass, is filled successively in proportion as he digests it, and it passes into the intestines, where the principal decomposition of the food is performed.

Chewing the cud is but a vomiting without straining, occasioned by the re-action of the first stomach on the food which it contains. The ox fills the two first stomachs, the paunch, and the bag, which is but a portion of the paunch, as much as he can. This membrane acts with force on the grass which it contains; it is chewed but a little, and its quantity is greatly increased by fermentation. Were the food liquid, this force of contraction would occasion it to pass by the third stomach, which only communicates with the other by a narrow conveyance, and cannot admit such dry food, or, at least, can only admit the moister parts. The food must, therefore, necessarily return to the *œsophagus*, the orifice of which is larger than the orifice of the conduit, and the animal again chews and macerates it, and then imbibes it afresh with his saliva, and thus by degrees makes the aliment more moist. He reduces it to a paste, liquid enough to enter this conduit which passes into the third stomach, where it is again macerated before it enters the fourth; and it is in this last stomach that the decomposition of the hay is finished, which is reduced to a perfect mucilage.

What chiefly confirms the truth of this explication is, that as long as these animals suck, and are fed with milk and other liquid aliments, they do not chew the cud. They chew the cud much more in winter, when they are fed with dry food, than in summer, when they eat tender grass.

Good milk is neither thick nor thin: its consistence should be such, that when we take a drop, it should preserve its roundness without running, and in colour should be of a beautiful white. That which is inclinable to blue or yellow is not good. Its taste ought to be sweet, without any bitterness or sourness. It is better in the summer, than in the winter; and is never perfectly good but when the cow is of a proper age, and in good health. The milk of young cows is very thick, and that of old ones during the winter the same. The milk of cows which are hot, is not good, any more than that of a cow which is near her time, or which has lately calved. In the third and fourth stomach of the calf which sucks, there are clots of crudled milk. These when dried in the air, serve to make runnet or that well known substance which coagulates milk. The

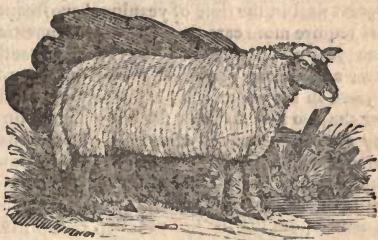
longer the runnet is kept, the better it is: a small quantity of which is required to make a great deal of cheese.

Bulls, cows, and oxen, are apt to lick themselves, but mostly when they are quiet; and as it is thought that it hinders them from fattening, it is usual to rub all the parts they can touch with their dung. When this precaution is not taken, they raise up the hair of their coats with their tongues, which are very rough, and then swallow it in large quantities. As this substance cannot digest, it remains in the stomach, and forms round, smooth balls, which sometimes are of so considerable a size, as to prevent digestion. These knobs in time get covered with a brown crust, which is somewhat hard. It is, notwithstanding, but a thick mucilage, which, by rubbing and coaction becomes hard and shining. They are never found any where but in the paunch, and if any of the hair gets into the other stomachs, it does not remain but seems to pass with the aliments.

Animals which have incisive teeth, such as the horse and the ass, in both jaws, bite short grass more easily than those which want incisive teeth in the upper jaw. Hence if the sheep and the goat bite the closest, it is because they are small, and their lips are thin. But the ox, whose lips are thick, can only bite long grass; and it is for this reason that they do no harm to the pasture in which they feed, as they can only bite off the tops of the young grass. They do not stir the roots, and for this reason scarcely hurt the growth: but the sheep and the goat bite so close, that they destroy the stalks and spoil the roots. The horse chooses the most delicate grass, and leaves the largest to grow, the stalks of which are hard. The ox, on the other hand, bites these thick stalks, and by little and little destroys the coarse grass; so that, at the end of some years, the field in which the horse has lived becomes a very bad one, whilst that on which the ox has broused, becomes fine pasturage.



THE RAM.



THE EWE.

OF all animals, the sheep is the most weak, simple and innocent: it has many enemies, and its life is sought by every beast of prey, in preference to any other. It is the most defenceless of creatures.

The ram has but feeble arms; his courage is nothing but a petulance peculiar to himself, which is destroyed by castration. Weather sheep are more fearful than ewes; as the smallest noise, to which they are unaccustomed, is sufficient

to make them fly and to cleave close to one another. This fear is accompanied with the greatest ignorance; for though they are sensible of danger, they do not know how to escape it; and in the greatest storms they will not change their situation, except one of them leads the way and then the rest follow.

This animal, so cowardly in itself, is the most precious and useful to mankind; supplies our greatest necessities, furnishing us at once with food and cloathing. Nay the very milk, skin, bowels, bones, and even the dung have their peculiar excellencies.

These simple animals are of a very weak constitution, travelling soon exhausts them; and when they run, they pant and are soon out of breath. The great heat of the sun is as disadvantageous to them, as too much moisture, cold and snow. They are subject to many disorders, the greatest part of which are contagious; too much fat sometimes kills them, and always prevents them from having lambs. They suffer a great deal in the time of yeaning, have frequent abortions, and require more care than any other domestic animal.

At one year old, sheep lose the two front teeth of the lower jaw; and almost every one knows that they have no incisive teeth in the upper. At eighteen months, the teeth adjoining the two first that fell, fall also; and, at three years old, they are succeeded by others. They are then even, and tolerably white; but, in proportion as the animal grows older, they become uneven and black. The age of the ram is known by his horns, which shew themselves the first year, and frequently from the time of yeaning. They grow every year a ring which is a mark round. Sheep in general have no horns; except two bony prominences in the same parts where those of the rams grow; there are, notwithstanding, some sheep which have two, and some four horns. These sheep are like the other; their horns are five or six inches long, but less turned than those of the ram; and when there are four horns, the two exterior are shorter than the two interior ones.

Sheep carry their young five months, and drop them at the beginning of the sixth. They usually produce but one lamb, and sometimes two. In warm climates they year twice, but in cold ones only once a year.

Ewes have plenty of milk the first five or six months after yeaning, which makes tolerable food for children and poor people in the country; it also makes good cheese, especially when it is mixed with cow's milk.

In dry soils, and high grounds, where wild thyme and other odoriferous herbs abound, the flesh of the sheep is of a much better quality than when it is fed in plains and humid valleys, unless these plains are sandy and near the sea; then the herbs imbibe a saltiness, which gives the mutton a most agreeable relish. Milk is also more plentiful, and of a better flavour, for nothing is more pleasing to the taste of these animals than salt, so nothing is more salutary when given in moderation; hence, in some places, they put a bag of salt, or a salt stone into the fold, which the sheep will lick alternately with their food.

Nothing contributes more to fatten sheep, than to give them plenty of water, and nothing prevents this advantage so much as the burning heat of the sun.

We frequently find worms in the livers of animals; and in the *Journal des Savans*, there is a description of worms found in the livers of sheep and oxen, as also in the German *Ephemerides*. One would think, that these singular worms were only found in the livers of animals which chew the cud; but Mr Deubenton assures us, he found some which exactly resembled them in the liver of an ass; and it is probable, that they may be found in the livers of other animals. It has also been said, that butterflies have been found in the livers of sheep.

The work of sheep-shearing is performed once a year. In France it is executed in the month of May, after the sheep have been well washed, in order to make the wool as clean as possible. In April it would be too cold; and if they were to wait till the month of June or July, there would not be time for the wool to grow in order to preserve them from the cold in winter. The wool of ewes is generally better, and in greater abundance, than that of other sheep; and that on the neck, and top of the back, is the best. White wool is preferable to grey, brown, or black, because in dying it will take any colour. Respecting the quality, that which is smooth is better than that which is frizzled; it is also said, that sheep, the wool of which is frizzled, are not

so healthy as others. Another considerable advantage arises from sheep, by enclosing them on the ground we wish to improve: the dung, urine, and heat of which, will, in a little time, enrich the most exhausted, cold, and infertile land. A hundred sheep, in one summer, will enrich eight acres for six years.

The ancients affirmed, that all animals which chew the cud, have tallow; but this is only true of the ox, the sheep, and the goat; that of the goat is abundantly whiter, firmer, and of a better quality than any other. It is about the loins that it is found in the greatest quantities, and the left loin has always a larger quantity than the right. Sheep have no other fat about them but the suet; and this matter is so predominant in their habit, that all the extremities of the body are edged with it; even the blood contains a considerable quantity.

The wool of Italy, Spain and England, is finer than that of France.

Those animals with large long tails, which are so common in Africa and Asia, and to which travellers have given the name of Barbary sheep, appear to be of a different species from ours, as well as the lambs of America.





THE GOAT.

THOUGH the species of animals in general differ from each other; yet there are some which approach so near each other, that space is hardly left for a bare line of distinction. The ass might almost replace the horse; and, if the species of sheep were to fail, that of the goat might supply the defect. The goat like the sheep, affords both milk and suet in considerable quantities. Her hair though rougher than wool, serves to make very good stuffs; and her skin is worth more than that of the sheep. The flesh of a young goat nearly resembles that of a lamb. These auxiliary species are wilder and more robust than the principal species. The ass and the goat do not require so much care as the horse and the sheep; for they every where find food to support them; and brouze equally on plants of all kinds. They are less affected with the intemperance of the climate, and can do better without the help of man: hence the less dependance any thing has on us, the more it seems to belong to nature.

Although the goat is a distinct species, yet he will couple with the sheep; but no intermediate species has been produced by this acquaintance. These two species are distinct, remaining constantly separated, and always at the same dis-

tance from each other, and have never been changed by this mixture, or produced any new stock.

The goat has naturally more understanding, and can shift better for herself than the sheep. She comes voluntarily, and is easily familiarised: is sensible of caresses, and capable of attachment: she is also stronger, lighter, more agile, and less timid than the sheep: she is lively, capricious and lascivious.

Goats are fond of straying into solitary places, climbing steep ascents, sleeping on the tops of rocks, and the brinks of precipices.

The inconstancy of this animal's nature is shewn by the irregularity of her actions; she walks, stops short, runs, jumps, advances, retreats, shews, then hides herself, or flies, and this all from caprice, or without any other determinate cause than her whimsical vivacity. All the suppleness of her organs, and all the nerves of her body, are scarcely sufficient for the petulance and rapidity of these motions, which are so natural to her. That these animals are naturally fond of mankind, and that in uninhabited places they do not become wild, the following anecdote is a striking confirmation. In 1698, an English vessel having put into harbour at the isle of Bonavista, two negroes presented themselves on board, and offered the Captain as many goats as he chose. The Captain being surprised at this offer, the negroes observed, that there were only twelve persons in the island, that the goats multiplied so fast as to become troublesome; and that far from having any difficulty in taking them, they followed them with a kind of obstinacy, like domestic animals.

Goats go five months with young, and bring forth at the beginning of the sixth. They suckle the young ones a month or five weeks; so that it may be reckoned about six and twenty weeks from the time of their coupling till the young kids begin to eat. The goat generally produces one kid, sometimes two, very rarely three, and never more than four; and she brings forth young from a year or eighteen months, till she is seven years old. The knobs in their horns, and teeth, determine their ages. The number of teeth is not always the same in female goats; but they have generally fewer than the male, which has also the hair rougher, and the beard and horns longer. These animals,

like oxen and sheep, have four stomachs, and chew the cud. They are more diffused than sheep: goats like ours are found in several parts of the world, as in Guinea, and the warm countries, where they are smaller; but in Muscovy, and other cold climates, much larger. The goats of Angora, and of Syria, have ears hanging down, and are of the same species with ours. They mix and produce together, even in our climate. The males have horns almost as long as the common goat; but their circumference and direction are very different. They are extended horizontally on each side of the head, and form spirals, somewhat like worms. The horns of the female are short, and first turn round backwards, then bend down, and turn round before, so that they end near the eyes; and in some their circumferences and directions vary. The male and female goat of Angora, which I have seen, are such as I have described; and these goats, like all the animals of Syria, have the hair so very long, thick, and fine, that stuffs have been made of it, almost as handsome and glossy as our silks. It is, in fact, what is commonly termed *mobair*.





THE HOG.

I SHALL treat of the sow, the hog of Siam, and the wild boar at the same time, as they form but one and the same species.

Aristotle first divided quadrupeds into beasts with the hoof entire, those with cloven feet, and the species which has claws. He allows that the hog is of an ambiguous nature; but the only reason he gives, is, that in Illyria swine are found which have hoofs, and in some other parts a species which have claws. This animal is also a kind of exception to the two general rules of nature, viz. That the larger animals are, the fewer they produce at a birth; and that of all animals, those which have claws are the most prolific. The sow, which in her make is greatly above the middle size, produces more of her kind at a litter, than any other quadruped.

To the singularities we have already related, we shall add another, which is, that the fat of the hog is different from that of almost all other quadrupeds, not only in its consistence and quality, but also in its position in the body. The fat of man, and of animals which have no tallow, such as the dog, the horse, &c. is mixed pretty equally with the flesh. The tallow in the ram, goat, stag, &c. is found only in the extremities. In the hog, the fat covers the flesh and forms a thick, distinct, and continued bed or layer, between the flesh and the skin: this he has in common with the whale, and

other cetaceous animals, the fat of which is only a kind of lard, nearly of the same consistence with, but more oily than that of the hog.

There is only the hog, and two or three other species of animals, which have defensive or very long canine teeth; and they differ from the other, by growing out on each side of the inferior jaw. In the elephant, and sea-cow, they are cylindrical, and some feet in length. In the wild boar, and male hog, they are partly bent; and I have seen them from nine to ten inches long. They are not very deep in the socket, and have also, like those of the elephant, a cavity at the superior extremity; but the elephant, and the sea-cow have their defensive teeth in the upper jaw, and even want the canine in the lower. The male hog, and the wild boar, on the other hand, have them in both jaws, and those of the inferior are not only the most useful but the most dangerous; for it is with these the wild boar wounds his enemy.

Of all quadrupeds, the hog appears to be the most rough and unpolished; and his voraciousness seems to be owing to the incessant avidity he has to fill the vast capacity of his stomach. It is the roughness of the hair, the hardness of the skin, and the thickness of the fat, which render these animals so insensible to blows. Mice have been known to lodge in their backs, and to eat the fat without their being sensible of it. Their other senses are good; and huntsmen know well, that wild boars see, hear, and smell, at a great distance. In order, therefore, to surprise them, they wait in silence during the night, and place themselves under the wind, to prevent the boars from smelling them, for if they do, they immediately change their road.

This imperfection in the senses of the taste and touch, is still more increased by a distemper called the measles, which renders them almost insensible. This disorder, in general, arises from the coarseness of their food; for the wild boar, which usually lives on corn, fruits, acorns, and roots, is not subject to it, nor are young pigs whilst they suck. The only preventative is, by keeping them in a clean stable, and giving them plenty of wholesome food; by which means their flesh will be well flavoured, and the lard firm and brittle.

The Wild Boar is hunted by dogs, or else taken by surprise in the night by the light of the moon. The old ones should only be attacked, and these are easily known by their traces. A young boar, of three years old, is difficult to be taken, as he runs a great way without stopping; an old one suffers himself to be closely hunted, and is not afraid of the dogs. In the day time, he usually hides himself in the thickest and most unfrequented part of the wood, and at night goes out in quest of food. In summer, when the corn is ripe, it is easy to surprise him, particularly among oats, which he frequents every night. Immediately a boar is killed, the huntsman cuts off his testicles, the smell of which is so strong, that in five or six hours, his flesh would be infected. Of an old wild boar, the head only is good for food; but, the flesh of a young one is extremely delicate.

No one is ignorant of the value of the hog. His flesh sells for more than that of the ox, the lard for double; and the blood, bowels, viscera, feet, and tongue, when properly prepared, may all be eaten. The dung is much colder than that of other animals, and should not be used but on hot and dry lands. The skin is used in making sieves; and brooms, brushes, and pencil-brushes are made of the hair. The flesh of this animal takes salt and salt-petre better than any other, and will retain their qualities longer.

This species, though abundant, and greatly spread in Europe, Africa, and Asia, was not found on the continent of America, until it was first carried there by the Spaniards; who also carried large quantities to almost all the islands of that Continent. They have multiplied and become wild in many places; and resemble our wild boars, with this difference only, that the body is shorter, the head larger, and the skin thicker. Domestic hogs in warm climates are all black like wild boars.

The Hog of Siam resembles the wild boar more than the common hog. One of the most evident signs of their degeneracy, is from the ears, which become more supple when the animals undergoes this change: in short, those of the domestic hog are not near so stiff, are much longer, and more pendant, than those of the wild boar, which should be regarded as the model of the species.

CHAP. II.

Of another Class of Domestic Animals---The Dog---Its Varieties---The Cat.



THE MASTIFF DOG.



THE SHEPHERD'S DOG.

THE largeness of the make, the elegance of the form, the strength of the body, the freedom of the motions, and the exterior qualities, are not the noblest properties of an animate being. As in mankind, understanding is preferred to figure, courage to strength, and sentiment to beauty;

so the interior qualities are those which we esteem most in animals. It is these that make them differ from the automaton, and by which they are raised above the vegetable, and made to approach near to ourselves. It is their senses which ennoble their being, command the organs, make the members active, give birth to desire, and to matter progressive motion, will, and life.

The dog, independent of his beauty, vivacity, strength, and swiftness, has all the interior qualities which can attract the regard of man. The tame dog comes crawling, to lay at his master's feet his courage, strength, and talents, and waits his orders to use them. He consults, interrogates, and beseeches. A glance of his eye is sufficient; he understands the signs of his will. Without the vices of man, he has all the ardour of sentiment; and, what is more, he has fidelity and constancy in his affections. He has no ambition, no interest, no desire of revenge, no fear but that of displeasing his master. He is all zeal, all warmth, and all obedience. More sensible of benefits than wrongs, he soon forgets, or only remembers them to make his attachment the stronger. Far from running away, he licks the hand which is the cause of his pain, he only opposes it by his cries, and at length entirely disarms it by his patience and submission.

More docile and flexible than any other animal, the dog is not only instructed in a short time, but he even conforms himself to the motions, manners, and habits of those who command him. He has all the manners of the house where he inhabits. Like other domestics, he is always attentive to his master; and striving to anticipate the wants of his friends, he gives no attention to indifferent people. When the care of the house is intrusted to him during the night, he becomes sometimes ferocious. He watches, he walks his rounds, he scents strangers afar off; and if they happen to stop, or attempt to break in, he flies to oppose them, and by reiterated barkings, efforts, and cries of passion, he gives the alarm. As furious against men of prey as against devouring animals, he flies upon, wounds, and tears them, and takes from them what they were endeavouring to steal; but, content with having conquered, he rests himself on the spoils, will not touch them even to satisfy his appetite, and at once gives an example of courage, temperance, and fidelity.

Thus we may see, of what importance this species is in the order of nature. Without the assistance of the dog, how could man have been able to tame, and reduce to slavery, other animals? How could he have discovered, hunted and destroyed, wild and noxious creatures? To keep himself in safety, and to render himself master of the living universe, it was necessary to begin by making himself friends among animals, in order to oppose them to others. The first art, then, of mankind, was the education of dogs, and the fruit of this art was the conquest and peaceable possession of the earth.

The dog, ever faithful to man, will always preserve a portion of empire, and a degree of superiority over other animals. He commands them, and reigns himself at the head of a flock, where he makes himself better understood than the voice of the shepherd. Safety, order, and discipline, are the fruits of his vigilance and activity. But it is in war against animals which are his enemies, that his courage shines forth, that his understanding is displayed, and that his natural and acquired talents appear. As soon as the horn, or the voice of the huntsman, has given the signal of an approaching war, transported with fresh ardour, the dog expresses his joy, and shews by his emotions, and cries of impatience, his desire to combat and to conquer. Then, in silence, he investigates the traces of his enemy, and, by different cries, indicates the time, the distance, the species, and even the age, of his prey.

In deserts and depopulated countries, there are wild dogs, which differ only from wolves, by the facility with which they are tamed. They unite also in large troops, to hunt and attack wild boars and bulls, and even lions and tygers. In America, the wild dogs spring from a breed anciently domestic, having been transported from Europe; and either forgotten or abandoned in these deserts, have multiplied to such a degree, that they go in troops to inhabited places, where they attack the cattle, and sometimes insult the inhabitants. They are then obliged, either to drive them away or kill them like other ferocious animals; in fact, all dogs are such till they become acquainted with man. When, however, we approach them with gentleness, they soon become familiar, and remain faithfully attached to their masters. The

wolf, on the other hand, although taken young, and bred in the house, is only gentle in his youth, and never loses his desire for prey, but sooner or later gives himself up to the love of rapine and destruction.

The dog, is the only animal, the fidelity of which may be put to the proof. He is the only one which knows his master and his friend, the only one which perceives the approach of a stranger; and, in short, he is the only animal the talents of which are evident, and education good.

Of all animals, the dog has an understanding most susceptible of impressions, and is most easily taught by moral causes. He is also, above all other creatures, most subject to alterations, occasioned by physical influences. The temperaments, faculties, and habits of dogs, vary prodigiously, and their make is not uniform. In the same country, one dog is very different from another, and it is observed, that the species varies with the climate.

What is most difficult to ascertain amidst this variety, is, the character of the primitive and original breed. How are we to know the effects produced by the influences of the climate, food, &c.?

Among domestic animals, the dog is the most attached to man. He is a creature, over which sentiment predominates, to render him sufficiently docile, obedient, and susceptible of impressions, and even of constraint. It is not astonishing, therefore, that of all animals, this should be that in which we find the greatest variety, not only in figure, in height, and in colour, but in every other quality.

Dogs, which have been abandoned in the deserts of America, and have lived wild for a hundred and fifty, or two hundred years, though changed from their original breed, have notwithstanding this long space of time, retained, at least in part, their primitive form, and travellers report, that they resemble our greyhound. These wild dogs, however, are extremely thin and light; and, as the greyhound does not differ much from the cur, or from the dog called the shepherd's dog, it is natural to think, that these wild dogs are rather of this species, than the real greyhounds. Ancient travellers inform us, that the dogs of Canada have their ears straight like foxes, and resemble our middle sized mastiff, or

shepherd's dog, and that those of the deserts of the Aratilles Isles, have the head and ears long, and are very like foxes.

Besides, what we learn from the narratives of travellers; we find, that dogs of cold climates have all long snouts and straight ears: those of Lapland are small, their ears straight, and snouts pointed; those of Siberia, known by the name of wolf-dogs, are larger than those of Lapland; but are in every other respect like them. We learn too, that those of Iceland, have also some resemblance to those of Siberia; and that in warm climates, the dogs natural to those countries have sharp snouts, straight ears, and tails dragging on the ground; the hair long, frizzled, and shining.

We may presume then, that the shepherd's dog approaches nearest to the primitive race of this species; for in all countries inhabited by savages, or men half-civilized, the dogs resemble this kind. In America, they had no other. In France, where this species is usually called the shepherd's dog, and in other temperate climates, it is still more numerous; notwithstanding, we are more engaged in raising dogs which are pleasing, than preserving those which are profitable, and which we have abandoned to the peasants who take care of our flocks.

Dogs are generally produced with their eyes shut. The eye-lids are not only closed, but united by a membrane, which breaks away as soon as the muscle of the upper eyelid is strong enough to raise itself: most dogs do not open their eyes till the tenth or twelfth day, at which time, the bones of the skull are not finished, the body is puffed up, the snout swelled, and they have not their proper form. In less than a month they learn to exercise all their senses, and begin to have strength and a swift growth; and in the fourth month, they get some of their teeth, which in all, amount to forty two.

Bitches go with young nine weeks, that is, sixty-three days, but never less than sixty. Length of life, in dogs, is like that of other animals, proportioned to the time required for their growth; and if they are about two years in growing, they will live fourteen.

In the Memoirs of the Academy of Sciences, we find the history of a bitch, which having been accidentally left behind in a country-house, subsisted forty days without any other

food than the stuff or the wool of a mattress that she had torn. Water seems to be more necessary for dogs than food: they drink often, and a great deal at a time; and it is even a vulgar opinion, that if they want water long, they become mad.

The hound, the setting-dog, and the terrier, are only one and the same species; for it has been remarked, that the same birth has produced setting-dogs, terriers, and hounds, though the hound bitch had only been covered by one of the three.

The beagle, and almost all sorts of dogs, transported into Spain and Barbary, have fine, long, and thick hair, and become spaniels and barbets. The great and little spaniels, which differ only in the size, when transported into England, change their colour from black to white, and by the influence of the climate become large, small, and shabby. To these we may add the terrier, which is but a black beagle, like the other, but with liver-coloured marks on the four feet, the eyes, and the snout.

The shepherd's dog, transported to the north, becomes a large Dane; and to the south, becomes a greyhound. The largest greyhounds come from the Levant; those of a middle size from Italy. Greyhounds from the latter of these places, when transported into England, degenerate in size.

The large Danes, transported into Ireland, Ukrain, Tartary, Epirus, and Albany, become large Irish dogs, and in size, surpass all the rest of the species.

The bull-dog, transported from England into Denmark, becomes a small Dane: and this small Dane when transported into warm climates, loses his hair entirely, and becomes the naked Turk dog. All these races, with their varieties, have been produced solely by the influences of climate, joined to the effect of their food, and of a careful education. The other dogs are not of a pure race, and come from a mixture of these races.

The greyhound, and the shepherd's dog, produce the mongrel greyhound, which is called the greyhound in wolf's cloathing. Of this mongrel, the snout is not so thin as that of the Turkish greyhound, which is very rare in France.

The large Dane, and the large Spaniel, have produced together the dog of Calabria, which is a handsome dog

with long, thick hair, and which is taller than the larger mastiff.

The spaniel and the terrier produce another kind of dog, called the Burgundy spaniel. The spaniel and the little Dane produce the lion-dog, which is very scarce.

The dogs with long, fine, and curled hair, which are called dogs of Purgos, and which are of the size of the largest bar-bets, come from the large spaniel and the barbet.

The little barbet comes from the small spaniel and the barbet.

The bull-dog with a mastiff bitch, produce a mongrel, called the strong bull-dog, which is much larger than the real bull-dog, and more like him than the mastiff.

The pug comes from the English bull-dog, and the little Dane.

All these races are simple mongrels, and come from the mixture of two pure races; but there are also other dogs, which may be called double mongrels, because they come from the mixture of a pure race, and of one already mixed.

The shock-dog is a double mongrel, which comes from the pug and the small Dane.

The dog of Alicant is also a double mongrel, which comes from the whelp and the little spaniel.

The Maltese, or lap-dog, is a double mongrel, and comes from the small spaniel and the barbet.





THE WILD CAT.

THE Cat, though an animal of prey, is a useful domestic. She is neither wanting in sagacity nor sentiment; but her attachment is stronger to places than to persons. The form of her body corresponds with her disposition. The cat is handsome, light, adroit, cleanly, and voluptuous: she loves ease, and searches out the softest furniture to repose upon.

Cats go with young fifty-five or fifty-six days; and their usual number is four, five, or six. Young cats are gay, lively, pretty, and would be very proper to amuse children, if the strokes of their paws were not to be feared. Their disposition, which is averse to all restraint, renders them incapable of a regular education. We are told, however, of the Greek friars of Cyprus, having taught cats to hunt, take, catch, and destroy the serpents with which that island was infested. Their scent is far from being good, and therefore they cannot pursue their prey any longer than they see it; but wait and attack it by surprise.

The immediate physical cause of this inclination, which they have to spy out, and surprise other animals, is owing to the particular conformation of their eyes. The pupil of the eye in man, as well as in other creatures is capable of a certain degree of contraction and dilatation. It enlarges a little when there is no light, and contracts when the light becomes too strong.

In the eyes of a cat, and nocturnal birds, this contraction and dilatation are so considerable, that the pupil, which in obscurity is large and round, becomes in open day, long and narrow. For this reason, these animals see better in the night than in the day, the form of the pupil being always round when it is not constrained.

Cats seem to have a natural dread of water, cold, and bad smells. They are fond of perfumes, and gladly suffer themselves to be taken and caressed by persons who use them. The scent of Valerian has so powerful an effect on these creatures, that they appear transported with it; and, in order to preserve this plant in gardens, it is common to surround it with a close fence. Cats smell it from afar, will run and rub themselves with it, and pass and repass so often over it, as to destroy it in a short time.

As they are very cleanly, and their coats always dry and shining, the hair when rubbed with the hand in any dark place, produces electric fire. Their eyes shine in the dark, almost like diamonds, and may be said to reflect during the night, the light which they collected the preceding day.

In this climate, we know of but one species of the wild cat; and it appears from the testimony of travellers, that this species is found in almost all climates, without any great variety. There were some of them on the continent of America before it was discovered. A huntsman carried one which he had found in the woods to Christopher Columbus. This cat was of the common size, the hair of a dark grey, with the tail long, and very strong. There were some of the same sort of cats in Peru, though they had no tame ones; and there are some in Canada, in the country of the Illinese, &c. They have been seen in several parts of Africa, as in Guinea, the Gold Coast, and Madagascar, where the original inhabitants had domestic cats. At the Cape of Good Hope, Kolbe says, there are also wild cats of a blue colour; and these blue, or rather slate-coloured cats, are found again in Asia.

It may be remarked, in general, that of all the climates of the inhabited earth, those of Spain and Syria are the most favourable to the beautiful varieties of Nature. The sheep, goats, dogs, cats, rabbits, &c. of those countries, have the finest wool, the most beautiful hair, and the most agreeable

variety of colours. The colour and hair of the wild cat, like most other wild animals, are rather coarse. When tamed, the latter becomes more soft, the former more variegated; and in the favourable climates of Chorasan and Syria, the latter becomes longer, finer, and more copious, and the former uniformly softened; the black and red changing into a transparent brown, and the dark brown into an ash grey. By comparing a wild cat of our forests with one of those of Chorasan or Syria, we shall find, that the only difference between them consists in this shaded variety of colours. As these animals have therefore more or less white upon the belly and the sides, it is easy to conceive, that, in order to have cats entirely white, and with long hair, such as we properly term cats of Angora, we have only to select from this race those which are whitest on the belly and the sides, and to keep them together, as we do rabbits, dogs, goats, &c. In the province of Pe-chi-ly, in China, there are cats with long hair, and hanging ears, of which the Chinese ladies are exceedingly fond. These domestic cats, with hanging ears, of which we do not possess a more ample description, are, no doubt, more remote than those with ears, from the straight race of the wild cat, which, nevertheless, is the original and primitive race of all cats.



CHAP. III.

*Of certain intermediate Animals between Wild and Domestic
---The Stag, or Red-Deer---Fallow-Deer---Roe-buck.*



THE STAG.

THE Stag is one of those mild, innocent animals, which seems as if he was created solely to adorn and animate the solitude of the forest; and to occupy, remote from man, the peaceful retreats of Nature. His light and elegant form, his flexible yet nervous limbs, his head rather adorned than armed, his grandeur, swiftness, strength, &c. sufficiently distinguish him from the rest of the inhabitants of the forest.

The old stags shed their horns every year, about the end of February, or the beginning of March. Stags in their seventh year lose this ornament about the latter end of March; and those in their sixth year in the month of April.

After they have shed their horns, they remain no longer in covert; but seek the beautiful parts of the country, the groves, and the open coppices, where they remain till they recover the antlers which used to adorn their brows. During this season, they carry their heads low, for fear of striking them against the branches; as they are exceedingly tender till they arrive at perfection. The horns of the old stags are scarcely half grown by the month of May; nor do they attain their full length and hardness till about the end of July. The horns of the young ones are later in coming to perfection, and when they are completely lengthened and become quite hard, they rub them against the trees, in order to brush off the scurf with which they are covered.

The hinds, or females, carry their young eight months and a few days. They are not all alike prolific; and there is one sort in particular which is naturally barren. The fawn retains this appellation till it is six months old; when the knobs begin to appear, and then it takes the name of a knobber, which it bears till these knobs are lengthened to so many points, whence they are termed prickets or brockets. It does not quit its dam early, though it grows fast, but follows her all the summer. In winter, the hinds, knobbers, prickets, and the young stags, resort to the herd, and form troops which are numerous in proportion to the severity of the season. In spring they divide, the hinds retiring to bring forth their young; and at this time, there are scarcely any but prickets and the young stags which associate. In general, the stags are inclined to remain with each other, and to roam abroad in companies; and it is only from fear or necessity that they are ever found separated.

The growth of the horns appears to depend on the redundancy of the fluids, and has a near connexion with the production of the seminal fluid: for when the stags are castrated they cease to grow.

The beauty of this, and indeed of every other part, depend much upon their food; for a stag which lives in a plentiful country, where he feeds at his ease, is neither dis-

turbed by men nor dogs, and can lie down and ruminate quietly, has always a beautiful head, high, open, palmated, large, and well adorned at top, broad and curled at bottom, with a great number of long and strong antlers. In a country on the other hand, where he has neither sufficient food nor repose, his head will be in these respects the reverse. Hence it is not difficult to distinguish by the horns of a stag, whether or not he inhabits a fertile or a barren country.

The branches which sprout from the head of a stag, in their make and growth, resemble those of a tree. Their substance perhaps, is more of the nature of wood than of bone. It is, as it were, a vegetable grafted upon an animal, which partakes of the nature of both, and forms one of those shades by which nature always approximates two extremes.

The stag passes his whole life in the alternatives of plenitude and want, of corpulence and leanness, of health and sickness, without having his constitution much affected by the violence of either. Nor is he shorter lived than other animals, which are not subject to such vicissitudes. As he is five or six years in growing, so he generally lives, thirty five or forty. What has been reported, therefore, concerning the longevity of the stag, is without any good foundation, though supported by the story of one which was taken by Charles VI. in the forest of Senlis, with a collar round his neck, whereon was inscribed, "Cæsar hoc me donavit." People chose rather to believe, that this animal had lived a thousand years, and had received this collar from a Roman Emperor, than to conclude, that he might have come from Germany, where the Emperors have always assumed the title of Cæsar.

The horns of the stag continue to increase in bulk and height from the second year to the eighth; at which time they are very beautiful, and continue so during the vigour of life; but as the body declines with age, so does the beauty of their horns.

It is but seldom that our stags have more than twenty or twenty two antlers, even when their heads are the most beautiful. And, as the size of the stag's head depends on the quantity of his food, so the quality of his horns depends on the quality of it. In fertile countries, the quality of the horn is, like the wood of the forest, large, soft, and light;

and on the contrary, short, hard, and heavy, in such as are barren.

The most common colour of the stag is yellow, though there are many found of a brown, and others of a red colour. The colour of the horns, like that of the hair, depends on the nature and age of the animal, and in general on the impression of the air. The horns of young stags are whiter than those of the old ones. Those stags also, the hair of which is of a light yellow, the horns are often of a sallow hue, and offensive to the eye.

This animal appears to have good eyes, an exquisite smell, and a fine ear: and when he would listen to any thing, he raises his head, pricks up his ears, and can hear, at a great distance. When he issues from a little coppice, or some other spot half covered, he stops, to take a full view around him; and then snuffs up the wind in order to try whether he can discover the scent of any thing that may disturb him. Though naturally simple, he is far from being destitute of curiosity and cunning. If one whistles, or calls to him at a distance, he instantly stops short, and gazes with fixed attention; and if the person has neither arms nor dogs, he passes along without altering his pace. With equal tranquillity and pleasure he listens to the shepherd's pipe, or flagelet; and the huntsmen, in order to embolden him, sometimes use these instruments. In general, he is much less afraid of men than dogs, and entertains neither distrust nor artifice, but in proportion as he is disturbed. He eats slowly, chooses his food, and seeks afterwards to repose himself, that he may ruminate at leisure, thought not with the same ease as the ox; nor is it without undergoing much violence, that the stag, can throw up the food contained in his first stomach. He drinks but little in winter, and less in the spring.



THE FALLOW-DEER.

No two animals can be more nearly allied than the stag and the fallow-deer; yet no two more eagerly shun each other. They are never seen to herd in the same place; and it is rare, unless they have been transported thither, to find fallow-deer in a country where stags abound. They seem to be less robust than the stag; are rarely found wild in the forests: and those which are bred in parks, may be considered half domestic.

Of all the countries of Europe, England abounds most with stags; and, in that country, their flesh is highly esteemed. It appears to be an animal formed for a temperate climate; for none are found in Russia, and very few in the forests of Sweden, or the northern countries. As the fallow-deer is an animal less fierce, more delicate, and it may be added more domestic than the stag, it is likewise subject to greater varieties. Beside the common, and the white deer, there are several other kinds: the deer of Spain, for ex-

ample, which are almost as large as the stag, but with the neck more slender, colour more obscure, and the tail rather black than white underneath, and longer than that of the common deer; and the deer of Virginia, which are almost as large as those of Spain. Others, the foreheads of which are compressed and flattened between the eyes, the ears and tail longer than those of the common deer, and the hind legs have the hoofs marked with a white spot: others, which are spotted or streaked with white, black, and yellow; and others, which are entirely black.

The horns of the buck, like those of the stag, are shed every year, and take nearly the same time to grow again.

It frequently happens, that a herd of fallow-deer is seen to divide into parties, and to engage each other with great ardour. They both appear desirous to gain some favourite spot of the park for pasture, and to drive the vanquished party into the coarser and more disagreeable parts. Each of these factions has its particular chief, namely, the oldest and strongest of the herd. These lead on to the engagement; and the rest follow under their direction. Their combats, from the disposition and conduct by which their mutual efforts are regulated, are very singular. They attack with order, and support the assault with courage; they come to the assistance of each other, retire, rally, and never yield the contest upon a single defeat. The combat is renewed every day, till the feeble side is obliged to yield, by making their escape.

From the age of two, till that of fifteen or sixteen years, the fallow-deer is in a condition to be fruitful. In short, as it resembles the stag in all its natural habits, the greatest difference we find between these two animals is, in the duration of their lives. From the testimony of huntsmen, the stag is said to live to the age of thirty-five or forty; and, on the same authority, it is asserted, that the fallow-deer lives about twenty years.

THE ROE-BUCK.

THE stag, being the most noble among the tenants of the wood, inhabits the most secret parts of the forest, where the spreading branches form a lofty covert; while the roe-buck contents himself with a more lowly residence, and is seldom found but among the thick foliage of young trees and shrubs. Though this animal is less noble, less strong, and inferior in stature; he is, however, possessed of more grace, vivacity, and even of more courage, than the stag: for when his young are attacked, he combats even the stag himself, and often obtains the victory. He is more gay, handsome, and active; and his shape is more full, elegant, and agreeable than that of the stag. His eyes, in particular are more brilliant, and animated; his limbs are more supple, his movements quicker; and, possessed of equal vigour and agility, he bounds without effort.

The roe-buck differs from the stag, not only in superior cunning, but also in his natural appetites, inclinations, and habit of living. Instead of herding together like the latter, the species of the former lives in separate families. The sire, the dam, and the young ones, form of themselves a little community, nor do they ever admit a stranger. All other animals of the deer kind, are inconstant in their affections: but the roe-buck never forsakes his mate; for as they have been generally bred together, so the male and female manifest for each other the strongest attachment.

The female, of this species, goes with young five months and a half, and brings forth about the end of April, or the beginning of May. The hind goes more than eight months; which circumstance is sufficient to prove, that these animals are of a species so different, that they can never produce an intermediate race. The female separates herself from the male, when she is about to bring forth, by retiring into the thickest part of the woods, in order to avoid the wolf, which is her most implacable enemy. At the expiration of about ten or twelve days, the fawns, of which there are generally two at a birth, attain strength enough to follow her. When she is threatened with danger, she hides them in some

deep thicket, opposes herself to the enemy, and allows herself to be chased.

The fawns follow the buck and the doe eight or nine months; and upon separating, their horns begin to appear, like those of the stag, the first year, simple, and without antlers. These they shed at the latter end of autumn, and regain during the winter.

In the stag, fallow-deer, and roe-buck, there are two bony eminencies, on which their horns grow: they begin to shoot at the end of five or six months, and soon after arrive at their full growth. Far, however, from enlarging themselves as the animal advances in age, they diminish, and are the best evidences of the age of the species.

As the female goes only five months and a half with young, and as the growth of the young roe-buck is quicker than that of the young stag, so his life is shorter; and I do not believe that it extends beyond twelve or fifteen years, at the farthest. Roe-bucks remain during winter in the thickest coppices, and live on briars, broom, heath, &c. In spring, they repair to the more open groves, and browse on the buds and young leaves of almost every tree. This warm food, fermenting in their stomachs, inebriates them much, and renders them easy to be surprised.

It appears, that this species, which is not so numerous as that of the stag, and which is very seldom to be found in many parts of Europe, is pretty numerous in America. In that country, however, we hear only of two sorts, the red, which is the larger, and the brown; and as they are oftener found in the northern than in the southern parts of that continent, we may presume, that they differ more from each other there than they do in Europe. In Louisiana, for instance, they are extremely common, and much larger than in France. They are also found at Brasil; for the animal which is there denominated the *Cujuacu-apara*, differs not from the European roe-buck, more than the Canadian stag differs from that of France.

CHAP. IV.

Of wild Animals—The Hare, and the Rabbit.

THE HARE.

HARES abound in every quarter of the globe; and rabbits, though they originate only in particular climates, multiply so prodigiously in almost every place to which they are transported, that no small art is required to diminish their number.

In those districts which are reserved for the chase, four or five hundred hares may be killed in the course of one day's sport. These animals multiply amazingly; from the condition they are in to engender at all seasons, and that before they are a year old. The females do not go above thirty or thirty-one days with young; when they produce three or four, and are again ready to receive the male. They likewise receive him during their pregnancy, and, by a particular formation of their genitals, are often found to have a super-foetation.

Young hares are brought forth with their eyes open. The dam suckles them for the space of twenty days; after which they leave her, and provide for themselves: they do

not part far from each other; yet they live in solitude, and each composes for itself a form, at a little distance. Thus, when we find a young leveret in one place, we are almost sure of finding one or two near it. They feed more by night than by day; and their favourite articles of food, are herbs, roots, leaves, fruit and grain; but particularly such plants as yield a milky juice. In winter they even eat the bark of trees. When they are reared at home, they are fed with lettuces and roots; but the flesh of these domestic hares has always a bad flavour.

Hares sleep much, and always with their eyes open. They have no eye-lashes, and the organs of sight appear to be very bad. Their hearing, however, is exceedingly acute; and they move their ears, which are very large when compared with the size of their body, with great ease; and use them as a helm, in order to direct their course; which is so rapid, that they outstrip almost every other animal. As their fore legs are much shorter than their hind ones, they can more easily ascend than descend; for which reason, when they are pursued, their first object, is to gain some mountain, if possible. Their motion in running is a kind of gallop. They proceed without making any noise, because their feet are plentifully covered with hair; and they are perhaps the only animal which have hair growing within their mouths.

The hare does not live above seven or eight years. They pass their lives in solitude, and silence; and are never known to exert their voice, but when forcibly laid hold of, tormented, or wounded. They are by no means so wild as might be supposed, but are gentle, and susceptible of improvement. As they have a good ear, can rest on their hind-feet of their own accord, and use their fore-legs like arms, some have been taught to beat a drum, and to gesticulate in cadence, &c.

In general, the hare is not destitute of instinct necessary for her preservation, nor of sagacity sufficient to effect an escape from her enemies. She prepares for herself a form: in winter she chooses a spot which is exposed to the south, and in summer, one that is situated to the north. She hides herself among hillocks of earth which are of the same colour with her hair. "I have seen," says Du Foilloux, "a hare so cunning, that, as soon as she heard the huntsman's horn, she started from her form, and, though at the distance of a quarter

of a league from it, leaped to a pond where she hid herself among the rushes, and thus escaped the pursuit of the dogs. I have seen a hare, which after having run above two hours before the dogs, has dislodged another hare, and taken possession of her form. I have seen others swim over three ponds, the smallest of which was not less than eighty paces broad. I have seen others, which, after having been warmly chased for two hours, have entered a sheep-cot, through the little opening under the door, and remained among the cattle. I have seen others, when pursued, join a flock of sheep in the field, and remain with them. I have seen others, which, when they heard the dogs, have concealed themselves in the earth. I have seen others, which have gone along one side of a hedge, and returned by the other; so that there was only the thickness of the hedge between them and the dogs. I have seen others, which after they had been chased for half an hour, have mounted an old wall of six feet high, and taken refuge in a hole covered with ivy."

The nature of the soil has a great influence on these, as well as on every other animal. The hares of the mountains, are larger and fatter than those of the plains, and they are also of a different colour; the former being browner on the body, and whiter about the neck, than the latter, which are more inclined to red. On high mountains, and in northern countries, they become white in the winter, and in summer regain their ordinary colour.

THE RABBIT.

THOUGH the hare, and the rabbit, are externally, as well as internally, very much alike; yet they form two distinct and separate species.

The fecundity of the rabbit is even greater than that of the hare. Without crediting, however, what Wotton has advanced, that one pair being left in an island, produced six thousand in one year; it is certain, that these creatures multiply so prodigiously in countries which are proper for the breed, that the earth cannot furnish them with subsistence. They

destroy herbs, roots, grain, fruit, and even trees and shrubs: and were it not for the dog and the ferret, they would reduce the country to a desert. The rabbit not only engenders and produces oftener than the hare, but it has more ways to escape from its enemies, and to conceal itself from man.

This circumstance, alone, may suffice to prove, that the rabbit is superior to the hare in point of sagacity. Both are alike in their conformation, and both have it in their power to dig retreats for themselves. They are timid to an excess; but the one, possessed of less art, is contented with forming for itself a residence on the surface of the earth, where it remains continually exposed; while the other, by a more improved instinct, takes the trouble to dig into the earth, for an asylum.

The domestic rabbits, like all other domestic animals, vary in their colour: white, black, and grey, belong properly to Nature. Black rabbits are the most scarce.

These animals, are able to engender and produce at the age of five or six months. It is asserted, that they commonly attach themselves to one particular female, and never quit her. She goes with young thirty or thirty-one days, and will produce five, six, and sometimes seven or eight at a birth. Like the doe-hare, she has a double matrix; and of consequence can have in her womb at the same time, two separate litters. It appears, however, that super-fœtations are less frequent in this species than in that of the hare.

A few days before they bring forth, they dig themselves a fresh burrow, not in a right line, but in a crooked direction, at the bottom of which they make an excavation. After this, they tear a quantity of down from their bellies, and make a kind of bed for the use of their young. During the first two days they never quit them; nor stir abroad, unless forced by necessity, and then they return immediately. At this season they eat much and very quickly; and they tend and suckle their young above six weeks: till after which period, the buck never makes any advances to the doe. Often, when she quits the burrow and leaves her young behind, she stops up the entry to it with earth, diluted with her urine; and when they begin to venture to the edge of the hole, and to eat groundsel and other herbs which the doe picks out for them, the buck takes them between his paws, and endeavours by

vours, by licking, to give a gloss to their hair; he also licks their eyes, &c. and all of them, in their turn, partake equally of his care.

A gentleman, in my neighbourhood, who had amused himself with raising rabbits for many years, favoured me with the following remarks.

"I began," said he, "with only one male and one female, the former white, the latter grey; and of their produce, which was very numerous, the major part was grey; a great number of them white, and of a mixed colour; and some few were black. These animals appeared to have great respect for paternal authority; at least I judged so, from the great deference they shewed to their first ancestor, which I could always distinguish by his whiteness; he was indeed the only male of that colour which I had preserved. It was to no purpose the family increased. Those, which in their turns, became fathers, were still subordinate to him. Whenever they fought, whether on account of their females, or concerning their food, their great progenitor, as soon as he heard the noise, would run to the place of dispute with all speed. No sooner did they perceive him, than every thing was presently reduced to order; and if he surprised any one of them actually assaulting another, he used to separate him from the rest, and punish him upon the spot. Another proof of his dominion over his posterity, was, that they were accustomed to return at a whistle. Whenever I gave the signal, how distant soever they might be, this old one would immediately put himself at their head; and, though he came first, he made them all file off, and enter before him."

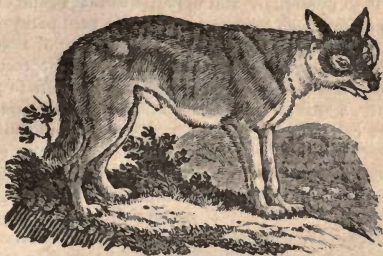


CHAP V.

*Of Carnivorous Animals---The Wolf---Fox---Badger---Otter
---Martin---Pine-Weasel---Pole-Cat---Ferret---Weasel
---and the Ermine.*

ANIMALS, which have but one stomach, and the intestines short; are forced, like man, to feed on flesh. Of this affinity, and this truth, we shall procure certain information, by a relative comparison of the size of the intestinal canal in carnivorous animals, with those that live solely on herbage. We then find, that the difference in their manner of living, depends entirely on their conformation; and their nourishment is more or less solid, as the receptacle for it is more or less capacious. But, we must not conclude, that those animals which live solely on herbage, are, from physical necessity, like carnivorous animals, absolutely confined to one kind of food. It is not meant, that they might not use animal food, or that if Nature had furnished them with arms, not only for the purposes of self defence, but for those of attack and rapine, that they would not have exerted them; for we find, that sheep, calves, goats, and horses, greedily eat milk and eggs; and that, unaided by custom, they do not refuse meat which has been hashed and seasoned with salt.

We need not, therefore, scruple to conclude, that the general appetite of animals is for flesh and other solid food; and that it is more or less voracious, according to the particular conformation of each animal: and, on taking a full view of Nature, we find it not only in man, but in quadrupeds, fishes, insects, and worms.

THE WOLF.

THE Wolf is one of those animals, the appetite of which, for animal food, is the most craving, and the means of satisfying it, the most various. Nature has furnished him with strength, with cunning, with agility, and in a word, with all those requisites, which fit an animal for pursuing, overtaking, and conquering its prey. Notwithstanding all these, he frequently dies of hunger. Being long proscribed, and a reward offered for his head, he is obliged to fly from the habitations of men, and to live in the forest. When pressed with hunger, however, he braves danger, and comes to attack those animals which are under the protection of man; particularly lambs, sheep, and even dogs themselves. If his excursion has succeeded, he often returns to the charge; till having been wounded, or closely pursued by the dogs or the shepherds, he hides himself by day in the thickest coverts, and, for a while, only ventures out at night. At last, however, when his necessities are very urgent, he boldly faces certain destruction. He attacks women and children, and sometimes ventures upon men. He becomes furious by his continual agitations, and ends his life in madness.

The wolf, as well externally as internally, so nearly resembles the dog, that he seems modelled upon the same plan; but presents us with the reverse of his disposition,

which is so dissimilar, and opposite to that of the dog, that no two animals can have a more perfect antipathy to each other. A young dog shudders at the sight of a wolf; but one which is stronger, bristles up at the sight, testifies his animosity, attacks him with courage, endeavours to put him to flight, and exerts his utmost efforts to rid himself of so hateful a creature. They never meet, without flying from or fighting with each other. If the wolf is the stronger, he tears and devours his prey. The dog, on the contrary, is more generous, and contents himself with having gained the victory.

The dog, even in his savage state, is not cruel; is easily tamed, and continues firmly attached to his master. The wolf, when taken young, becomes tame, but never affectionate. Nature is stronger in him than education; he resumes, with age, his natural disposition, and embraces the first opportunity to return to his native woods. Dogs, of the dullest kind, seek the company of other animals, and are naturally disposed to follow them; but the wolf is an enemy to all society, nor does he keep much company even with those of his own species. When they are seen in packs, it is not to be considered as a signal of amity among themselves, but a combination for war. They testify their hostile intentions by loud howlings; and by their fierceness, discover a project for attacking some great animal, such as a stag, a bull, or some formidable dog. The instant their military expedition is completed, each returns in silence to his solitary retreat. What is remarkable, there is not any strong attachment between the male and female; they seek each other only once a year, and remain but a few days together.

The difference in the duration of the pregnancy of the she-wolf, which goes with young above an hundred days, and the bitch, which does not go above sixty; proves, that the wolf and the dog, so different in disposition, are still more so in one of the principal functions of the animal economy.

The wolf generally brings forth five or six, and sometimes nine at a litter. The cubs are brought forth, like the dog kind, with their eyes closed. The dam suckles them for some weeks, and teaches them occasionally to eat flesh,

which she prepares, by chewing it herself. They do not leave the den till they are six weeks or two months old. It is not, however, till they are about ten or twelve months old, or till they have shed their first teeth and completed the new, that the dam thinks them in a capacity to shift for themselves. Whenever they have acquired arms from Nature, and have learned industry and courage from her example, she declines all future care of them, and is again engaged in rearing a new progeny. These animals require two or three years for their growth, and live to the age of fifteen or twenty.

The wolf grows grey as he grows old, and his teeth wear, like those of most other animals. He sleeps, when his belly is full, or when he is fatigued, and is always very easily awaked. He drinks frequently; and in times of drought, when there is no water to be found in the trunks of old trees, or in the pools about the forest, he visits the brooks, or lakes in the plain. Although very voracious, he supports hunger for a long time, and often lives four or five days without food, provided he is supplied with water.

The wolf has great strength in his foreparts, particularly in the muscles of his neck and jaws. He carries off a sheep in his mouth without letting it touch the ground, and runs with it much swifter than the shepherds who pursue him: hence, nothing but dogs can overtake, or oblige him to quit his prey. He bites cruelly, and the more so, the less he is resisted; with such animals as attempt to stand upon the defensive, he uses more precaution. He is cowardly, and never fights but when under the necessity of satisfying his hunger, or of making good his retreat. When he is wounded by a bullet, he howls; but when surrounded by the peasants, and attacked with clubs, he never howls, but defends himself, in silence, to the last.

If he happens to be caught in a pit-fall, he is for some time so astonished, that he may be killed without resistance, or taken alive without much danger. At that instant, one may put a collar round his neck, muzzle him, and drag him along, without his ever betraying the least symptom of anger or resentment. At all other times, his senses are in great perfection. He smells a carcass at the distance of more than a league; can perceive living animals a great

way off, and follow them a long time upon the scent. Whenever he leaves the wood, he always takes care to go out against the wind; and when he arrives at its extremity, he stops to examine, on all sides, by his smell, the emanations that may come either from his enemy or his prey, which he very nicely distinguishes. He prefers animals of his own taking, to those he finds dead; but when hungry, he does not disdain any, however putrid. He is particularly fond of human flesh; and, perhaps, if he had it in his power, would eat no other. Wolves have been known to follow armies, and to come in great numbers to the field of battle, where they devoured such dead bodies as were left upon the field, or but carelessly buried. These, when once accustomed to human flesh, seek particularly to attack mankind, prefer the shepherd to his flock, devour women, and carry off children: such dreadful wolves, are called, *ware-wolves*; that is, wolves of which we ought to be *aware*.

The colour of this animal, differs, according to the different climates in which he is bred, and often changes even in the same country. Beside the common wolves, which are found in France and Germany, there are others with thicker hair, inclining to yellow. In the northern climates, some are found quite black, and others entirely white. The former are larger and stronger than those of any other kind,



THE FOX.

THIS animal has always been famous for his artifices; and the reputation he has thus acquired, he partly merits. What the wolf cannot accomplish but by his superior strength, the fox accomplishes by his cunning. Without attempting to oppose either the shepherd, his dog, or his flock, he finds an easier way to subsist. Patient and prudent, he waits the opportunity for depredation, and varies his conduct according to circumstances. Though as indefatigable, and more nimble than the wolf, he does not trust entirely to his swiftness, but contrives for himself an asylum, to which he retires in cases of necessity, and in which, sheltered from danger, he brings up his cubs.

The fox generally fixes his residence at the edge of a wood, and not far from a cottage, or hamlet. He listens to the crowing of the cock and the cackling of other domestic fowls, can scent them at a considerable distance, and seizes his opportunity. If he is able to get into the yard, he begins by making a general destruction: after which, he carries off a part of the spoil, hides it at some convenient distance, and again returns to the charge, taking off another fowl in the same manner, which he hides also, but not in the same place; and thus he perseveres, till warned by the

approach of day, or the noise of the family, he finally retires. He practises the same art, when he finds birds entangled in snares laid by the fowler, which he anticipates very expertly; snatches them out of the snare, conceals them in different places, leaves them there sometimes for two or three days, and is never at a loss to recover his hidden treasure. He is equally alert in seizing young hares and rabbits, before they have strength to escape him; and when the old ones are wounded and fatigued, he is sure to seize them in the moment of distress. In the same manner, he finds out the nests of partridges and quails, and seizes the hens as they sit.

The fox is so voracious, that, when he has no better food, he devours rats, mice, lizards, toads, and serpents. Insects and shell-fish sometimes serve him for food. In vain does the hedge-hog roll itself into a ball to oppose him. Wasps and wild bees are attacked by him with equal success. Though at first they fly out upon their invader, and actually oblige him to retire, yet this repulse is but for a few minutes, till he has rolled himself upon the ground, and crushed such as may have stuck to his skin. He then returns to the charge, and at length, by dint of perseverance, obliges them to abandon their combs, which he greedily devours.

Young foxes are produced blind, and like dogs, are eighteen months or two years in reaching their full growth, and they live about thirteen or fourteen. The senses of the fox are as good as those of the wolf; his sentiment is more acute, and the organ of his voice is more supple, and perfect. The wolf is never heard but by dreadful howls; the fox only yelps, barks, and sends forth a moanful sound, resembling the cry of the peacock. His tones, too, are different, according to the different sentiments with which he is affected. He has one sound expressive of desire, a second of murmur, a third of sorrow, and a fourth of pain. The latter is never heard, but in the instant he is wounded by a shot, and has lost the use of some member; for, like the wolf, when attacked with cudgels, he never murmurs, but will defend himself with obstinacy, and fight, in silence, to the last. He bites dangerously, and with such determined

fury, that, in order to make him relinquish his hold, ponderous wood, and even iron bars, are necessary.

The flesh of the fox is not so bad as that of the wolf: dogs, and even men, eat it in autumn, especially if the animal has fed on grapes; and, in winter, good furs are made of his skin. He sleeps so sound, that however closely approached, there is no great danger of awaking him. When he only means to rest himself, he stretches out his hind legs and remains flat upon his belly. In this posture, he watches for the birds as they perch on the hedges; which they no sooner perceive, than they give each other warning of their danger. The jack-daw and the magpie, in particular, often follow him to the distance of some hundred paces, towering beyond his reach, and with cries reiterated, apprize others to beware.

Of all wild animals, the fox is most subject to the influence of climate; and there are found nearly as many varieties in this species, as in that of any domestic animal. The generality of French foxes are red; of some, the hair is of a greyish cast; and of all, the tip of the tail is white. In the northern countries, we find foxes of all colours.





THE BADGER.

THE Badger is a lazy, distrustful, solitary animal, that retires far from the approach of man, and digs a subterranean residence, where he spends, at least, three-fourths of his existence, and never ventures forth but in search of food. He burrows in the ground with particular ease: the hole he forms is often at a very great distance from the surface, and the passage to it, always oblique and winding.

The fox, which is less expert at such excavations, often appropriates the labours of the badger to his own use. Unable to drive him from his retreat by force, he expels him by stratagem, by remaining at the mouth of the passage, and as an infallible expedient, emits his ordure. When the badger has left it, he immediately takes possession. At a little distance from his old burrow, the badger forms a new one, from which he never stirs but at night. The dogs easily overtake him, when at a distance from his hole; and then, exerting all his strength and powers of resistance, he throws himself upon his back, and defends himself with desperate resolution.

Several badgers have been brought to me; some of which I kept a long time. The young ones are easily tamed; will play with young dogs, and follow any person they know, from whom they will receive their food; but the old ones

in spite of every effort, remain wild. They are neither so mischievous nor voracious as the fox and the wolf, yet are carnivorous; and though raw meat is their favourite food, they will eat any thing that comes in their way. They sleep the greatest part of their time, without being subject, like the mountain-rat, or the dormouse, to a torpor, during winter. Hence, though they feed moderately, they are always fat.

The female brings forth in summer, and her usual number is three or four at a birth. These, at first, she feeds with her milk, and afterwards with such petty prey as she can surprise. She seizes young rabbits in the warren, robs birds of their young, and wild bees of their honey; and when she finds field-mice, lizards, serpents, and grass-hoppers, she carries all to her expecting brood, which she frequently brings forward to the mouth of the hole.

These animals are naturally of a chilly temperament; and such as are reared in a house seem never more happy than when near a fire. Their hair is always filthy; on which account they are very subject to the mange: and unless the dogs that penetrate their burrows, are afterwards carefully washed, they generally catch the infection. Between the anus and the tail of the badger, there is an opening, which, though it has no communication with any interior part, and is hardly an inch deep, continually emits an oily liquid of which he is very fond. His flesh is not absolutely nauseous; and of his skin are made coarse furs, collars for dogs, trappings for horses, &c.

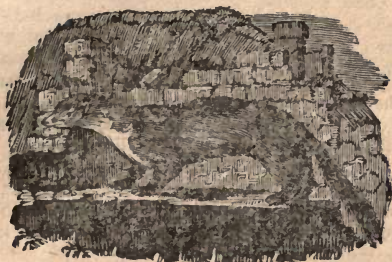


THE OTTER.

THE Otter is a voracious animal, which is more fond of fish than flesh; and is seldom found but at the sides of lakes and rivers.

Accurately considered, the otter cannot be pronounced amphibious; for we frequently find them drowned, when entangled in a net. For want of fish, frogs, water-rats, or other nourishment, it will eat the young branches, and the bark of aquatic trees; and in spring, the new grass becomes excellent food. The otter brings forth in the month of March, and generally produces three or four at a birth.

The industry of this creature increases with its age, and it wages a successful war against the finny tribes; which, with respect to instinct and sentiment, are greatly inferior to other creatures. It does not dig its own habitation, but fixes its residence in the first hole that offers; either under the root of the willow or the poplar-tree, in the clefts of rocks, or among piles of floating wood; and there the female brings forth her young. It frequently changes its residence; and disperses its young ones at the end of six weeks, or two months.



THE MARTIN.

NATURALISTS have generally considered the Martin and the pine-weasel as animals of the same species; but they are different both in disposition and temperament. The pine-weasel shuns open countries, confines itself to the forest, fixes its residence upon some tree, and is never found in great numbers but in cold climates. The martin, on the other hand, not only approaches human habitations, but even forms a residence for itself in old buildings, hay-lofts, or the holes of walls; and though the species is found in great numbers in the temperate climates, it is not to be met with in the regions of the North.

The countenance of the martin, is very sharp; its eyes are lively; its limbs, supple; its body, flexible; and all its movements are quick. It rather leaps or bounds, than walks; and with great facility climbs walls, enters pigeon, and hen houses, and devours every thing it meets with; on other occasions, it destroys mice, rats, moles, and birds in their nests.

This animal is said to be as prolific as the cat. The growth of the young ones is very quick: hence it may be inferred, that it is an animal the life of which does not exceed eight or ten years. Its smell, which is not very disagreeable, is like that of counterfeit musk. The martin and the pine-weasel, as well as a number of other animals, have interior vesicles, which contain a strong-scented substance like that of civet.

THE PINE-WEASEL.

THE Pine-Weasel is a native of the north, where they are so numerous, that their furs are carried to foreign countries in large quantities. In temperate climates, they are rarely, and in warm climates never, to be found. There are some in Burgundy, and some in the forest of Fontainebleau; but, in general, they are as scarce in France as the martin is common. There are none in England, because in that country there are no very extensive woods.

Alike averse to open countries, and to such as are inhabited, they remain in the bosom of some forest, range through the labyrinths of the thicket, or tower aloft upon the branches of the trees. They subsist by the chase, and destroy a prodigious quantity of birds. Of the squirrel, the dormouse, &c. they also make a prey, and are known to eat honey as well as the martin.

The neck of this weasel is yellow, whereas that of the martin is white; and its hair is much finer, thicker, and less subject to shed.

When the female is near her time, her custom is to climb to the nest of some squirrel, drive it away, and enlarge it for her own use. In the same manner she occupies the old nests of the owl and the buzzard, and the hollow places of trees, from which she presently dislodges the wood-pecker, and other birds.

THE POLE-CAT.

THE Pole-Cat is somewhat smaller than the martin: its tail and snout are shorter and sharper, and its hair thicker and blacker. It has some white on its forehead, and about the nose and mouth. It differs, likewise, in its voice; the cry of the martin being rather sharp and loud; that of the pole-cat, deep and hollow: neither does it re-

seemble the martin in smell, for it is perfectly fetid. When heated, but especially enraged, it emits a stench that is absolutely intolerable. Dogs will not eat its flesh; and even its skin, which is good in itself, sells at a very low price, as it cannot be entirely divested of its natural odour.

THE FERRET.

It has been doubted, whether, or not, the Ferret and the pole-cat are animals of two different species. Perhaps the resemblance there is in the colour of their hair, first gave rise to this doubt. The pole-cat, though a native of temperate climates, is a wild animal like the martin; whereas the ferret, originally an inhabitant of hot countries, cannot exist in France but as a domestic animal. The ferret also, and not the pole-cat, is made choice of to drive the rabbits from their burrows; because it is more easily tamed. The body of the ferret is longer and thinner, and the head and snout narrower and sharper than those of the pole-cat. Nor has it the same sagacity in providing for its subsistence; it cannot exist, at least, in our regions, without the care of man; for such of the species as have been lost in burrows, have perished from the severity of the winter.

This animal is an inveterate enemy to the rabbit; if even a dead one is presented to a young ferret, which had never seen one before, it springs at it and tears it with fury; if it be alive, it seizes it by the neck and nose, and immediately sucks its blood. When ferrets are sent into the burrows of rabbits, it is necessary to muzzle them, that they may not kill, but only make them run out, and thereby fall into the net laid for them at the entrance. If they are allowed to go unmuzzled, there is a risque of losing them; because, after having sucked the blood of the rabbit, they fall asleep. Besides, the smoke which is raised at the mouth of the burrow, does not always prove a sufficient expedient for bringing them back; as there are often more issues than one, and one burrow generally communicates with others.



THE WEASEL.

THE Common Weasel is as abundant in temperate, and hot countries, as it is rare in cold ones. Though of the same species, it is in many respects different from the ermine, which is a native of the north.

When a weasel enters a hen-roost, it never meddles with the cocks or the old hens; but makes choice of the pullèts, and young chickens, all of which it kills with a single stroke on the head, and carries away one after another. It also destroys the eggs, and sucks them with incredible avidity. In winter, it generally resides in some granary, or hay-loft; where the female often continues in the spring in order to bring forth her young among the hay or straw: during which time, the male makes war against the rats and mice with more success than the cat; for it follows them into all their holes, and prevents their escape. It also climbs pigeon-houses, the nests of sparrows, &c. and commits great havock. In summer, it removes to some distance from the houses, always choosing the lower countries about mills and streams, and hides itself among the bushes, in order to catch birds; and not unfrequently takes up its habitation in the hollow of an old willow. The female generally produces four or five at a birth, which come forth with their eyes shut, but in a little time attain sufficient growth and strength to follow her to the chace. They attack adders, water-rats, moles, field-mice, &c. and traversing the meadows, devour snails and their eggs.

Like the pole-cat, and the ferret, these animals have so strong a scent, that they cannot be kept in any place that is inhabited; hence, as their own smell is so very bad, they seem to sustain no inconvenience from any foreign stench or effluvia. A peasant in my neighbourhood, took one day, three weasels newly brought forth in the carcass of a wolf, which had been suspended by its hind legs from one of the branches of a tree; and though it was in a putrid state, the old weasel had brought grass, straw, and leaves, to make a bed for her young ones in the cavity of the thorax.

THE ERMINE, OR STOAT.

THE weasel, with a black tail, is called the ermine, when it is white; and the stoat, when it is red or yellowish. Though it is an animal less common than the weasel, there are great numbers to be found in the old forests; and sometimes during the winter, in the neighbourhood of woody grounds. It is easily distinguished from the common weasel by the tip of its tail, which is always of a deep black; and the edges of its ears, and the extremities of its feet, are white.



CHAP VI.

Of Certain Smaller Animals of the Carnivorous Class---The Squirrel--Rat---Mouse---Long-tailed-Field-Mouse---Water-Rat--Short-tailed Field-Mouse---Guinea-Pig---Hedge-Hog---Shrew-Mouse---Water Shrew-Mouse---Mole---Bat---Fat Squirrel---Garden-Squirrel, or Greater Dormouse---Dormouse---Brown Rat---and the Marmot.



THE SQUIRREL.

THE Squirrel is a beautiful little animal, which is only half-wild; and for its gentleness, docility, and innocence of manners, deserves to be exempted from the present class. It is neither a carnivorous nor an injurious animal; and though it sometimes seizes on birds, its general food consists of fruit, almonds, hazel-nuts, beech-mast, and acorns. It is neat, cleanly, alert, lively, and industrious. Its eyes, are full of fire; its countenance, sharp; its body, nervous; and its limbs, supple.

The beauty of its form, is farther embellished by a fine spreading tail, like a plume of feathers; which it raises above its head, and forms into a kind of shade.

The squirrel is less a quadruped than almost any other four-footed animal. It generally sits upright, and uses its fore-feet as hands. Instead of hiding itself in the earth, it is continually in the air; by its lightness and activity it resembles the feathered tribe; and like them, rests upon the branches of trees, leaps from one to another, and in the highest of them, builds its nest. It avoids water more than the earth; and it is even asserted, that when this animal is obliged to cross a river or stream, it uses the bark of a tree, or some light woody substance, as a boat, while its tail supplies the place of sails, and a rudder. In summer, it collects a quantity of nuts which it deposits in the cavity of some old tree, and to which it has recourse for provision in winter; and such is the agility of its body, that it can, in an instant, climb the smoothest beech-tree.

There are many species which approach that of the squirrel, though there are few varieties in the species itself. Some are of an ash-colour, and the rest, red. The small grey squirrel is of a different species; as are the flying squirrels. The white squirrel of Cambay, is very small, and has a tail like that of the European squirrel. That of Madagascar, called *Tsitsibi*, is grey, and according to Flaccourt, is neither handsome, nor fit to be tamed. The white squirrel of Siam; the grey and spotted squirrel of Bengal; the streaked squirrel of Canada; the black squirrel; the large grey Virginian squirrel; the white-striped squirrel of New Spain; the white Siberian squirrel; the variegated squirrel; the little American squirrel; that of Brasil, Barbary, the *Palmist*, &c. form so many species distinct from that which we have described.

THE RAT.

UNDER the general name Rat, several species of small animals have been comprised; but we shall appropriate this name to the common rat only, which is of a dark colour, and infests our houses: and give each of the other species its particular denomination.

This animal is carnivorous, and we may use the expression *omnivorous*. It prefers hard to soft substances, devours wool, stuffs, and furniture of all sorts; eats through wood, makes hiding-places in walls, from whence it sallies forth in quest of prey, and frequently returns with as much as it is able to drag along; forming, especially when it has young ones to provide for, a magazine of the whole. The females bring forth several times in a year, though mostly in the summer season; and they generally produce five or six at a birth.

In defiance of cats, traps, and every other method that is used to destroy these creatures, they multiply so fast, as frequently to do considerable damage. In old houses, in the country, where great quantities of corn are kept, and where the neighbouring barns and hay-stacks favour their retreat, as well as their multiplication, they would become dangerously numerous, were they not to devour each other; especially when straitened for provisions. The method they take to do this, is, for the stronger to dispatch the weaker: they then lay open their skulls, eat the brains, and afterwards the rest of the body: and hostilities are thus renewed day by day, till the major part is destroyed. Hence it is, that

rats often disappear of a sudden, after they have infested a place for a long time.

The female always prepares a bed for her young, and provides them immediately with food. On their first leaving the hole, she watches over, defends, and will even fight the cats, in order to protect them. The weasel, though a smaller animal, is a more formidable enemy than the cat. The rat cannot inflict any wounds but by snatching with its foreteeth; which, being calculated for gnawing rather than biting, have but little strength. The weasel, on the other hand, bites fiercely; and, instead of letting go its hold, sucks the blood through the wound. In every conflict with an enemy so dangerous, it is no wonder, that the rat falls a victim.

There are many varieties in this species, besides the common black rat; as the brown rat, the almost black, the grey, inclining to white or red, and the white. The white rat, like all other white animals, has red eyes; and this species, with all its varieties, appears to belong to the temperate climates of our continent, and are found in greater numbers in hot, than in cold countries. Originally, they had no rats in America; and those which are found there at present, are the produce of rats, which accidentally obtained a footing on the other side of the Atlantic with the first European settlers. Of these, the increase was so great, that the rat was long considered as the pest of the colonies; where it had but one enemy to oppose it, viz. the large adder, which swallowed it alive. The European ships have likewise carried these animals to the East Indies, to all the islands of the Indian Archipelago, as well as to Africa, where they are found in great numbers. In the North, they have hardly multiplied beyond Sweden; and those which are called Norwegian and Lapland rats, are animals of a different species.



THE MOUSE.

THE Mouse is an animal smaller than the rat; but its instinct, temperament, and disposition, are the same; nor does it materially differ from the rat, but by its weakness, and the habits arising therefrom. It is by nature, timid; by necessity, familiar; its *fears* and *wants* are the sole spring of its actions. It never leaves its hiding-place, but to seek for food; nor does it, like the rat, migrate from one house to another, unless compelled by necessity. Its manners are milder; and, to a certain degree, it may be tamed. It is, however, utterly incapable of attachment.

If it were not for its immense fecundity, this species would soon cease to exist. I have known them bring forth, even in traps. They produce at all seasons, and several times in the year, and their usual number is five or six; which, in less than fifteen days, attain sufficient strength to shift for themselves. As they soon attain perfection, the duration of their life must be very short; a circumstance which cannot but heighten our idea of their prodigious multiplication. Aristotle tells us, that, having put a pregnant mouse into a vessel of corn, he soon found in it one hundred and twenty.

THE LONG-TAILED FIELD-MOUSE.

THE Long-tailed Field-Mouse is smaller than the rat, larger than the common mouse, and does not live in

houses. It is remarkable for the largeness and prominence of its eyes. It differs from the rat and the mouse in the colour of its skin, which is tolerably white under the belly, but of a reddish brown upon the back. The species is generally and abundantly diffused.

The largest are above four inches from the tip of the nose to the root of the tail ; and the smallest, which appear to be full grown as well as the others, are an inch shorter. Although many are found of different intermediate sizes, they are all of the same species.

These creatures are fond of dry and elevated grounds. In woods, and the fields adjoining, they are to be found in great numbers. They conceal themselves in holes, which they either find already made, or make for themselves under bushes, or the trunks of hollow trees. In these, they amass so prodigious a quantity of acorns, nuts, &c. that in one hole there has been found a bushel at a time.

These holes are generally more than a foot underground, and often divided into two cells, one of which serves for an habitation, and the other for a granary. I could never find any other method of preventing their ravages, than that of setting traps at every tenth pace through the whole extent of each piece of new-sown land.

THE WATER-RAT.

THE Water-Rat, is a little animal, about the size of the common rat ; but in its nature and habits, resembles the otter. Like the otter, it is generally found on the borders of rivers, rivulets, and ponds ; it feeds upon fish, or the spawn of fish, and sometimes it eats frogs, water-insects, and even roots and herbs. This animal is not web-footed ; yet it swims with ease, keeps itself a long time above water, and thence carries off its prey.

The head of the water-rat is shorter, the nose broader, the hair more erect, and the tail much longer than that of the land rat. Like the otter, it flies from large rivers, or rather from those which are too much frequented, and is never found in houses or barns.

It is probable, that these animals bring forth often in a year; but of this we have no certain information. Their flesh is not very bad, for in Catholic countries, the peasants eat it during Lent, as they do that of the otter. This species is common in Europe, the extremities of the north excepted.

THE SHORT-TAILED FIELD-MOUSE. ---

THE Short-tailed Field-Mouse is more generally diffused than the long-tailed, and is found almost every where; in woods, in meadows, and even in gardens. It is remarkable for the thickness of its head, and the shortness of its tail, which is not above an inch long. It forms holes in the earth, where it hoards up corn, nuts, and acorns; the former of which it prefers to every other kind of food. About the month of July, when the corn begins to ripen, they flock together from every quarter, and frequently do great damage, by cutting the stalk, in order to come at the ear. In autumn and winter, most of them retire to the woods, where they find beech-mast, nuts, and acorns. For want of other food, they often eat one another, and are themselves the usual prey of the fox, the wild-cat, the martin, the weasel, and the long-tailed field-mouse.





THE GUINEA-PIG.

THE Guinea-Pig, though a native of the warm climates of Brasil and Guinea, lives and breeds in temperate and even in cold countries, provided it is properly taken care of. Its skin is of little or no value; and the flesh, which is very indifferent food, might be greatly improved, were they reared in warrens, and supplied with a proper choice of herbs.

These animals attain their full growth in eight or nine months. The female never goes with young above three weeks; and has been known to bring forth when only two months old: the first litter amounts to four or five, the second to five or six, and the rest to seven or eight, and sometimes to ten or eleven; and she does not suckle her young above twelve or fifteen days. A thousand might be raised from a single couple, in one year, did they not frequently destroy each other, or perish by the cold and wet.

The guinea-pig feeds on all sorts of herbs; especially on parsley, which it prefers to bran, flour, or bread. Of apples and other fruit it is exceedingly fond. It eats like the rabbit, quick, little at a time, but very often; and grunts somewhat like a young pig.

These animals are so delicate, that it is with difficulty they survive the rigour of winter. When they feel cold, they assemble together, press close to one another, and in this situation are frequently found dead.

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THE HEDGE-HOG.

THE Hedge-Hog has the power of defending itself from an enemy without combating, and of annoying without attacking him. Possessed of little strength and no agility, by which it may escape its foes, it has received from Nature a prickly armour, with a facility of rolling itself up, and presenting from every part of its body a poignant weapon of defence. From its fear, this animal obtains another engine of security; viz. the smell of its urine, which, when attacked, it generally emits, and is sufficient to make its enemy quit the field. Hence, the generality of dogs are content with barking at the hedge-hog when it falls in their way; without discovering any inclination to seize it. Of these, however, there are some which, like the fox, have had the address to overcome it; though of the martin, the pole-cat, the ferret, the weasel, or any of the birds of prey, it has no dread.

They are generally found in woods, under the trunks of old trees, and in the clefts of rocks. I do not believe that they climb up trees, as some Naturalists have affirmed, or that they make use of their prickles to carry off the fruit. It is with their mouth they seize it; and though they are very numerous in our forests, I have never seen one of them in a tree; but, on the contrary, at the foot in some hollow space, or under moss. They continue in a state of inactivity during the day, and only venture abroad by night; but seldom approach human habitations. They sleep dur-

ing winter; therefore, every thing, that has been said of their hoarding up provisions for that season, must be false. They never eat much, and can subsist a long time without any food whatever; and their flesh, like that of all other torpid animals, is not proper food; nor is their skin of any use.

THE SHREW-MOUSE.

THE Shrew-Mouse seems to fill up the vacuum between the rat and the mole: it is smaller than the domestic mouse, and resembles the mole in its snout, which is longer than its jaw-bones. Its eyes, though larger than those of the mole, are, in like manner, concealed; and much smaller than those of the domestic mouse. The form and number of its claws, tail, legs, particularly the hind ones, which are shorter than those of the domestic mouse, ears and teeth, resemble those of the mole.

This diminutive creature has a smell peculiar to itself, which is so strong and offensive to cats, that though they cheerfully kill, they will not eat it. It is this noisome odour, this aversion of the cat to it, that gave rise to the notion that the shrew-mouse is a venomous animal, and that its bite is dangerous to every kind of cattle, particularly horses. The truth is, that it is neither venomous nor capable of biting; for it cannot open its mouth wide enough to seize the double thickness of its skin. The distemper among horses, which the vulgar attribute to the tooth of the shrew-mouse, is a swelling which proceeds from an internal cause, and not from any bite or rather scratch that this little animal may give.

In winter, the shrew-mouse generally fixes its residence in some hay-loft, stable, or barn, where it feeds on grain, insects, and putrid flesh. It is likewise found in woods, and fields; where, living on corn, it sometimes conceals itself under moss or leaves, sometimes in holes abandoned by moles, and sometimes in holes of a smaller size, which it forms for itself with its claws and snout.

The shrew-mouse is said to produce as many at a birth as the domestic mouse, though less frequently. It has a squeak more piercing than the latter. In point of nimbleness, however, it is far inferior; and as it sees imperfectly, and runs slowly, it is easily taken.

The usual colour of these creatures is brown with a mixture of red. Others of them are ash-coloured; and they all are more or less white on the belly. They are very common in Europe, but do not seem to have obtained a footing in America.

THE WATER SHREW-MOUSE. ---

THE Water Shrew-Mouse, though a native of these regions, was unknown to our Naturalists, till M. Daubenton discovered it. It may be taken at the sources of fountains, in the morning and evening, as the sun rises and sets. In the day-time it remains concealed in the clefts of rocks, or in holes under ground, near the edges of rivulets. It brings forth in the spring, and generally produces nine young ones at a time.



THE MOLE.

THE Mole, which from the smallness of its eyes and those so concealed that they are of little or no use to it, possesses the senses of hearing and feeling in an eminent degree. Its skin is soft as silk ; and its little feet, each of which is furnished with five claws, are very different from those of other animals, and almost like the hands of a human being. Proportioned to the size of its body, its strength is great ; and the art of securing itself, of forming as it were, instantaneously, an asylum, of extending it, and obtaining, without the necessity of relinquishing it, an abundant subsistence is equally so.

The mole shuts up the entry to its retreat, which it seldom deserts, unless forced by heavy rains. It is fond of cultivated grounds, and is never to be found in those which are either muddy, hard, compact, or stony. It requires a soil that is soft, well supplied with esculent roots, insects, and worms, of which its principal nourishment consists.

As these animals seldom come above ground, they have but few enemies ; and very readily evade the pursuit of those which are stronger and swifter than themselves. The chief calamity that befalls them is, an inundation ; and when this happens, they are seen in numbers attempting to save themselves by swimming, and using every effort to reach the higher grounds. The greater part, however, as well as their young which remain in the holes, perish. Were it not for such accidents, from their great fecundity, they would become extremely troublesome. They generally

have four or five at a time; and it is easy to distinguish, from other mole-hills, that in which the female has brought forth her young. I am apt to think that they produce oftener than once a year. Of this I am certain, that moles newly produced are found from April to August; a circumstance which may be owing to their having been engendered sooner or later in the year.

The hole, in which they produce their young, is formed with singular skill, and merits a particular description. The female begins by erecting the earth into a spacious apartment, supported within by partitions, at proper distances, to prevent the roof from falling. As the hillock, in which the apartment is thus formed, is raised above the ground, the apartment itself is consequently above the level of the plain, and therefore less subject to inundations. The place being thus fitted, she procures grass and dry leaves as a bed for her young. There they lie secure from wet, and she continues to make their retreat equally free from danger: for round this hill, of her own raising, are holes running into the earth from the middle apartment, like rays from a centre, which extend above fifteen feet in every direction. These resemble so many walks or chaces into which the animal makes her subterraneous excursions, and supplies her young with such roots or insects as she can procure. Besides, they contribute much to the general safety; for as the mole is very quick of hearing, the instant she perceives her habitation attacked, she takes to her burrow, and unless the earth be dug away by several men at once, she and her young generally make good their retreat.

Some authors have said that the mole and the badger sleep during winter. That this is not true of the badger we have already observed; and as a proof that the mole quits its hole in that season, we have only to view the traces it leaves on the snow: in fact, it continues its subterranean operations then as well as in summer; hence the peasants of France proverbially remark that, "when the moles are at work, a thaw is at hand." They are very fond of warm places; and gardeners often catch them round their hot beds in the months of December, January, and February.



THE BAT.

AN animal, which, like the bat, is half quadruped and half bird, and which, in fact, is neither the one nor the other, is a kind of monster. In the bat, the fore-feet are, properly speaking, neither wings nor feet, though the animal uses them for the purposes of flying, and walking; but are two shapeless extremities, the bones of which are of a monstrous length, and connected by a membrane, without either feathers or hair. They are a kind of winged paws, of which we see only one claw about the length of an inch, and the other four claws, though very long, cannot act but in conjunction, and have no peculiar movements, no separate functions; or a kind of hands ten times larger than the feet, and four times longer than the length of the body. In short, they are parts which have rather the appearance of a capricious and accidental than a regular and determined production.

To these incongruities, these disproportions of the body and members, may be added the still more striking deformities of the head. In some species, the nose is hardly visible, the eyes are sunk near the roots of the ears, and are confounded with the cheeks. In others, again, the ears are as long as the body, or else the face is twisted into the form of a horse-shoe, and the nose covered with a kind of crust. Averse, likewise, to the society of all other creatures, they shun the light, inhabit none but dark and gloomy places; to which, after their nocturnal excursions, they are sure to return by break of day, and there remain fixed, as it were, to the walls till the approach of night.

Their motion in the air may be termed an uncertain flutter; which they seem to execute by struggles and in an awkward manner. They raise themselves from the ground with difficulty, never soar very high, and are but imperfectly qualified to accelerate or direct their flight; which, far from being either rapid or direct, is performed by hasty vibrations in an oblique and winding direction; and in passing along do not fail to seize all the gnats, moths, and other nocturnal insects that come in their way. These they swallow entire; for in their excrements, we meet with the remains of wings and other dry parts which they had not been able to digest. The bat brings forth and suckles her young like quadrupeds.

These animals do not produce more than two at a birth, and they frequently carry them with them when they fly. They unite in numbers to defend themselves from the cold, and pass the winter without awaking, stirring, or eating, from the end of autumn till spring. They belong to the number of carnivorous animals; and will devour bacon and meat of all kinds.

THE FAT SQUIRREL. ---

OF this animal we know three species; namely, the fat squirrel, the garden-squirrel, and the dormouse. Many authors have confounded these in one; but they are each of a different kind, and of consequence easily known and distinguished.

The fat squirrel is nearly of size with the common squirrel; and, like it, its tail is covered with long hair. It is without foundation that these animals sleep during winter: they are not in a state of natural sleep, but in a torpor; which is produced by the coldness of the blood. Their internal heat is so small, that it hardly exceeds that of the temperature of the air; for the heat of the air when it is ten degrees above the freezing point of a thermometer, is the natural heat of these animals. Now it is well known, that the internal heat of man, and of most animals, always exceeds thirty degrees; hence there is little reason to wonder that

these animals, so inferior to all others in point of heat, should become torpid. This is the real cause of torpor; a cause of which Naturalists have not been apprised, and which extends to all animals that are supposed to sleep during winter.

In this torpid state, they are without the smallest motion, their eyes are shut, and they seem to be deprived of the use of their senses; yet they feel pain when it is very acute, which they testify by a contraction, or a little hollow cry which they repeat several times. I am inclined to believe, that it is not from a too great waste of substance that they perish in long winters, for in autumn, they are excessively fat; and, on their reviving in spring, are much the same.

The flesh of the fat squirrel is not unlike that of the guinea-pig. They were considered as a luxury by the Romans, who reared great numbers of them. Like the common squirrel, this animal lives in forests, climbs to the tops of trees, and leaps from branch to branch but with less activity. Nuts and other wild fruit form its usual nourishment: it likewise eats little birds which it takes in their nests; and instead of nestling in the upper parts of trees, it makes a bed of moss in the trunks of those which are hollow. It also shelters itself in the clefts of rocks, and always shews a preference to dry places. It avoids moisture, drinks little, rarely descends to the ground, and, unlike the squirrel which is easily tamed, continues wild. The species is very common, but there are few if any of them in England.

THE GARDEN-SQUIRREL, OR GREATER DORMOUSE.

THE fat squirrel is a constant inhabitant of the forests, and shuns our habitations. The garden-squirrel, on the contrary, inhabits our gardens, and frequents our houses: the species is also more numerous than the former.

These animals nestle in the holes of walls, climb trees, select the best fruit, and gnaw it as it begins to ripen.

They also climb pear, apricot, and other trees; and in a scarcity of other fruit, eat almonds, nuts, and even leguminous roots which they carry in great quantities to their holes. The cold stupifies, the heat revives them; and sometimes there are eight or ten found in one place in a state of torpor, and huddled together in the midst of their hoard of provisions. Their flesh is not palatable, and has the disagreeable smell of the house-rat,

This animal is found in all the temperate climates of Europe; even in Poland and Prussia; but it does not appear that there are any in Sweden, or the more northern countries.

THE DORMOUSE. ---

Of all rats the Dormouse is the least ugly: its eyes are sparkling, its tail tufted, and its hair rather fair than red. It never lives in houses, is seldom found in gardens, but frequents the woods, where it finds a shelter in the hollow of some old tree.

The species is by no means numerous: yet they are pretty common in Italy, and are known in the northern climates, England excepted; for Ray, who had seen it in Italy, observes, that the small dormouse which is found in England is not red upon the back like the Italian, and that it probably belongs to another species.

The dormouse becomes torpid by cold, and rolls itself up in a ball; it revives in mild weather, and hoards up nuts and other dry fruit for future sustenance. It forms its nest like the squirrel, but in a lower situation, as among the branches of a nut tree, a bush, &c. The nest is composed of herbs interwoven, and is about six inches in diameter, has no aperture but at the top, and contains three or four young ones.

THE BROWN RAT.

THE Brown Rat is both stronger and more mischievous than the black rat. It has a reddish skin, a long tail without hair, the back-bone arched like that of the squirrel, the body much thicker, and whiskers like those of a cat. They multiply prodigiously; for they generally produce from twelve to nineteen young ones at a time. The males are larger, stronger, and more mischievous than the females. When any one pursues and endeavours to take them, they will turn again and bite the hand or stick that touches them; which is so far dangerous as to occasion a considerable swelling. They bring forth thrice a year; hence two individuals of this species will produce at least three dozen in that space.

The brown rat, in its nature and some of its habitudes, bears a strong resemblance to the water-rat. They delight to live near the water; and when they find themselves pursued and have an opportunity of sheltering themselves in the water or in a thorny thicket, they prefer the former, plunge into it without dread, and swim with amazing dexterity. This particularly happens when they cannot get back to their burrows; for they always dig holes for themselves in the earth, or else occupy those of the rabbit; where they may be taken by the ferret, which follows them with more ardour than it does the rabbit.

These animals live principally upon fruit and corn, but are, notwithstanding, exceedingly carnivorous. They devour young rabbits, partridges, and other birds; and when they enter a hen-roost, they destroy, like the pole-cat, more than they eat. In winter, they do not become torpid like the dormouse, but take advantage of every fine day to come out of their subterranean mansions. Those which live in barns, drive away the mice; and it has been remarked, that black rats, as they are called, are less common since the brown rats became more numerous.



THE MARMOT.

THE Marmot, when taken young, is more capable of being tamed than any other wild animal. It will easily learn to perform feats with a stick, dance, and obey the voice of its master. It bears great antipathy to the dog; and when it becomes familiar in a house, and is certain of being supported by its master, it will, in his presence, attack the largest dog, and boldly fasten upon him with its teeth. Though this creature is not quite so large as the hare, it is of a more squat make, and has great strength joined to great agility. It has four teeth in the front of the jaw, which are long and strong enough to inflict a terrible wound; but, unless provoked, it neither attacks dogs nor does mischief to any. If care be not taken, it will gnaw the furniture of a house, and will even make holes through wooden partitions.

As the marmot has very short thighs, and the toes of its paws are formed much like those of the bear; it often sits erect, and walks with ease, like that animal, upon its hind feet: it also eats in that posture; and like the squirrel, carries its food to its mouth in the same manner. It runs much swifter up hill than down; climbs trees, and runs up the clefts of rocks or the walls of houses with great ease. Indeed, it is ludicrously observed of the Savoyards, who are the general chimney-sweepers of Paris, that they have learned their trade of the marmot.

These animals eat whatever is given them ; whether flesh, bread, fruit, herbs, roots, pulse, or insects. Of milk and butter they are particularly fond ; and though less inclined to petty thefts than the cat, they are never better pleased than when they obtain access to the dairy.

There seems to be a combination of the bear and the rat in the form of the marmot. Its nose, lips, and form of its head, are like those of the hare ; it has the hair and claws of the badger, the teeth of the beaver, the whiskers of the cat, the paws of the bear, with a tufted tail and short ears. The colour of its hair, on the back, is a reddish brown ; on the belly, it is reddish, but softer and shorter. Its voice resembles that of a little dog when caressed ; but when it is irritated or frightened, it raises a loud and shrill cry very offensive to the ear. The marmot is a very cleanly animal, and would be tolerable food, were it not for its offensive smell.

This animal, which delights in the regions of ice and snow and is never found but on the highest mountains, is the most liable to be benumbed with cold. From the end of September or the beginning of October, it abides in its hole, and does not leave it till the beginning of April. The place of its retreat is formed with precaution and furnished with art ; is rather wide than long, and very deep ; so that it is capable of containing several, without being under a necessity of crowding each other, or injuring the air they breathe. Their feet and claws are formed for digging ; and they burrow the ground with amazing celerity, scraping up the earth, and throwing it back as they proceed. Their hole resembles the letter Y, the two branches having each an opening that conducts into one channel, which terminates in their apartment at the bottom which is warmly lined with moss and hay. As the whole is contrived on the declivity of a mountain, there is no part of it on a level but the apartment at the end. One of the branches or openings has a descent, which serves as a kind of sink or drain to the whole family, in which they void their excrements, and through which the moisture of the place finds an easy passage, the other branch projects upwards, and serves them for a door. It is asserted, that this work is carried on by the whole company ; that some cut the finest grass, o-

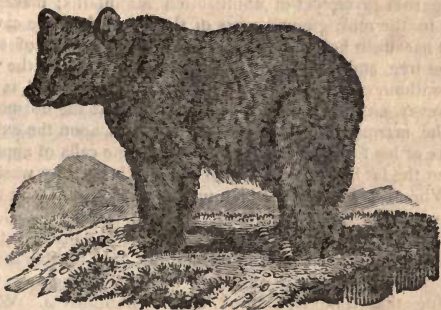
thers pile it up, and that others take their turns to convey it to the hole; which is done in the following manner: one of them lies upon its back, permits the hay to be heaped on its belly, keeps its paws upright to make all the room possible; and in this manner it is dragged by the tail to their common retreat. This practice some assign as a reason why the hair is generally worn off their backs.

They make no provision for winter; but when they perceive the season approaching, in which their vital motions are to continue, in some measure, suspended; they immediately close up the apertures of their dwellings, which they effect with such solidity, that it is more easy to open the earth in any other part than where they have closed it. They are at that time so very fat that some of them will weigh twenty pounds, and in this condition they continue for three months, when their flesh begins to waste, and they are quite thin by the end of winter. If discovered in this state, they may be taken away, and even killed, without betraying any symptom of pain; and those who find them in this manner, carry home the fat ones for food, and the young ones to rear, and tame them. The marmot produces but once a year, and the litter generally consists of three or four. Their growth is quick, and they live only nine or ten years. They are found in the Alps, Appenines, Pyrenees, in the highest mountains of Germany, in Poland, and Canada, with a few variations.



CHAP. VII.

*Of Carnivorous Animals continued---The Bear---Beaver---
Raccoon---Coati---and the Agouti.*



THE BEAR.

No animal is more generally known than the Bear, and yet there is none about which Naturalists are less agreed. These uncertainties have arisen from their not attending properly to the different species. The land-bear must be distinguished from the sea-bear, which is commonly known by the name of the White or Greenland bear. Land-bears must also be divided into two classes, the brown and the black. There are some white land-bears found in Tartary, Russia, &c. which, though they resemble the sea-bear in colour, differ from it in every other particular. It is not the rigour of the climate that makes them white, like the hare and the ermine ; it is their natural colour. There are

also bears the skins of which are a mixture of brown and black, which denotes an intermediate species between the white land-bear, and the brown or black bear.

We meet with the brown bear very frequently, and with the black very rarely on the Alps. The black bear, on the contrary, is very common in the forests of the northern countries of Europe and America. The former is fierce and carnivorous; the latter is fierce, but constantly refuses to eat flesh.

The bear is not only a savage, but a solitary animal; he takes refuge in the most unfrequented parts, and the most dangerous precipices of uninhabited mountains; makes his den in the most gloomy parts of the forest, in some cavern that has been hollowed by time, or in the hollow of some large tree, and thither he retires and passes part of the winter without provisions or ever stirring abroad. He is not, however, entirely deprived of sensation, like the dormouse, or the marmot, but seems rather to subsist upon the exuberance of his former flesh, and only feels the calls of appetite when the fat he had acquired in summer is entirely wasted.

When this happens, which we are told is generally after forty or fifty days, he forsakes his den; but the female remains confined for four months, till she has brought forth her young. That the latter should not only be able to subsist, but to nurse their offspring without taking any food during that time is, I think, highly improbable. When with young, however, it is allowed that they are exceedingly fat; as also that, being covered with a very thick coat, sleeping the greatest part of their time, and taking no exercise, they must necessarily lose very little by perspiration.

Though the males of the brown species devour their young when they have an opportunity; the females love them to a ferocious distraction. When they have brought forth, their fury is more violent, and more dangerous, than that of the males. Before the young leave the womb, their formation is perfect; and if either the foetus of the bear, or the bear when newly yeaned, appears unformed, it is because there is a want of proportion in the body and members of the female; and the foetus, or new produced animal, is always more disproportioned than the grown one.

The voice of the bear is a kind of growl or harsh murmur, which, when enraged, is heightened by a clashing of the teeth. Highly susceptible of anger, that anger is always furious, and often capricious. However mild he may appear before his master, and even obedient when tamed, he ought to be distrusted, and treated with circumspection. It is most dangerous to strike him on the tip of the nose, or to touch him on the parts of generation.

He is capable of some degree of instruction. There are few who have not seen him stand on his hind legs, or dance in a rude and awkward manner to tunes either sung or played on an instrument. But in order to tutor him with success, it is necessary that he be taken young, and held in constant restraint. A bear which has passed his youth, is not to be tamed, nor even held in awe; and shews himself, if not intrepid, at least fearless of danger.

The wild bear turns not from his path, nor offers to shun the sight of man. It is said, that by a certain whistle, he may be so far charmed as to stop and stand upon his hind feet; which is the time to shoot him. When only wounded, he darts with fury at his foe, and, clasping him with his fore paws, is sure to stifle him, unless immediate assistance be given.

The bear enjoys the senses of seeing, hearing, and feeling, in great perfection. His eyes, compared with the size of his body, are very small; his ears are short; his skin, coarse; and his hair, very thick. His smell is exquisite; more so, perhaps, than that of any other animal; the internal surface of his nose being very extensive, and excellently calculated to receive such impressions. He strikes with his paws as a man strikes with his fist, but in whatever he may bear a rude resemblance to the human species, he does not gain, by this, the least ascendancy over other animals.



THE BEAVER.

IN all countries, in proportion as man is civilized and improved, the lower are the ranks of animals depressed and degraded ; and are either reduced to servitude, or treated as rebels ; all their societies are dissolved, and their talents rendered useless.

The Beaver seems to be the only remaining monument of that kind of intelligence in brutes, which supposes certain common projects, and has certain relative ends in view. Projects which, having society for their basis, suppose some particular method of understanding one another, and of acting in concert.

It is allowed that the beaver, far from having an absolute superiority over other animals, is inferior to many of them. This fact, I have an opportunity to confirm, having had, for near a twelvemonth, a young one in my possession, which was sent me from Canada in the year 1758. It is an animal tolerably mild, tranquil, and familiar ; though rather gloomy and melancholy. If we consider it in its dispersed and solitary state, we shall find that, as to internal qualities, it has not more ingenuity than the dog, more sense than the elephant, or more cunning than the fox. It is rather remarkable for the singularity of its external conformation, than for any apparent superiority of internal qualities. Of quadrupeds, the beaver alone has a flat oval tail, covered

with scales, which serves as a rudder to direct its motions in the water. It is the only quadruped that has membranes between its hind toes, and none on the fore ones, with which it conveys its food to its mouth. It is the only one which, while it resembles a terrestrial animal in its fore parts, approaches the nature of an aquatic behind.

Beavers begin in the month of June or July, to form a society, which is to continue the greatest part of the year. They arrive in numbers from every quarter, and presently form a company of two or three hundred. The place of meeting is commonly the place where they intend to fix their abode, which is always by the side of some lake or river. If it be a lake, in which the waters are always upon a level, they do not build a dam; but, if it be a running stream, they build a dam or pier across it. This dam or pier is often four-score or an hundred feet long, and ten or twelve feet thick at the base. If we compare the greatness of the work with the powers of the architects*, it will appear enormous; but the solidity with which it is built, is still more astonishing. The part of the river over which it is usually built is the most shallow, and where some great tree is found growing by the side of it. This they make choice of for the principal part in their building; and, though it is often thicker than a man's body, they soon cut it down; for this operation they have no other instrument than their four incisive teeth, and they make it fall always across the stream; they then lop off the top branches to make it lie close and even.

These operations are performed in common. At one time a number of beavers are employed at the foot of the tree in gnawing it down; and when this part of their labour is finished, it becomes the business of others to separate the branches, while a third party are engaged along the banks of the river or lake, in cutting down others and stripping them of their bark; which, though smaller than the first, are as thick as the leg, if not the thigh, of a common-sized man. These they carry by land to the brink of the river, and then by water to the place appointed; where sharpening and form-

* The largest beavers weigh from fifty to sixty pounds, and, in length, are little more than three feet from the tip of the snout to the root of the tail.

ing them into stakes, they drive them into the ground at a small distance from each other, and fill up the vacant spaces with pliant branches. While some are thus employed in fastening the stakes, others go in search of clay, which they prepare with their tails and feet, and with which they render their structure still more compact.

This structure is so ingeniously contrived, that it has not only all the extent and solidity which are requisite, but also a form the most proper for resisting the water; and, when it has passed its bounds, for maintaining its weight, or baffling its attack. At the top of their dike or mole, where it is narrowest, they form two or three openings: these they enlarge or contract as the river rises or falls; and when, from inundations or torrents, their works have been damaged, they immediately repair them with the greatest care.

After this display of their labours to accomplish a public work, it would be superfluous to add a description of their private constructions, were it not that, in history, an account should be given of every fact, and that, in this first grand work of the beaver, the intention was, that the little habitation of each family should be rendered more commodious.

This habitation is always furnished with two passages; one for the purpose of a land, and the other for a water excursion. In shape it is always either oval or round, and from four to five feet in diameter; and consists of two, and sometimes of three stories, while the walls are always two feet thick. When it consists of but one story, the walls are only a few feet high, with a kind of vault over them which serves as a covering for the edifice; and the whole is plastered with such neatness, both without and within, that it might naturally be thought a human production. They sit to their work; and, besides the advantage of this convenient posture, they have the pleasure of continually gnawing fresh bark and soft wood, which they prefer to most other kinds of aliment. Averse to dry wood, they always provide an ample store of these for their subsistence during winter.* Near their habitation, they establish their magazines; and allot to each hut or cabin, a magazine proportioned to the num-

* The space allotted for the provision of eight or ten beavers, occupies from twenty-five to thirty feet square, and from eight to ten feet deep.

ber of its inhabitants, to which they have all a common right; nor do they attempt to plunder their neighbours.

Hamlets, to use the expression, have been seen, composed of twenty and even twenty-five dwellings. Such large settlements, however are very rare. In general, they do not contain more than ten or a dozen families; which will not allow a stranger to settle within their inclosure. The smallest dwellings contain two, four, and six; the largest, eighteen-twenty, and sometimes thirty beavers; and it seldom or never happens, that the number of males and females is not pretty equal. Their society, therefore, may be said to consist frequently of one hundred and fifty or two hundred workmen, which having first exerted their united industry and diligence in rearing a grand public work, afterwards form themselves into different bodies, in order to construct private habitations.

However numerous the republic of beavers may be, peace and good order are uniformly maintained in it. A common series of toil promotes their union; and the conveniences which they have procured for each other, and the abundance of provisions which they afterwards provide and consume together, render them happy within themselves. Having moderate appetites, and entertaining an aversion to blood and carnage, they have not the smallest propensity to hostility or rapine, but actually enjoy all the blessings which man can desire. Friends to each other, if threatened by foreign enemies, they know how to avoid them; and for this purpose, on the first alarm, they give notice of their mutual danger, by striking the water with their tails, which emits a sound that is heard in the most distant dwellings. On this occasion, each beaver, as he thinks most expedient, plunges into the water, or conceals himself within the walls of his own habitation, which is in no danger but from the fire of heaven, or the weapons of man.

These asylums are not only secure, but very neat and commodious: the floor is covered with verdure, young and tender branches of trees serve them for a carpet, on which they never permit any of their excrements to be left. The window, which fronts the water, serves them for a balcony, from which they enjoy the fresh air and bathe themselves the greatest part of the day. Their position in the water is

an upright posture, the head and fore parts only being visible. This element is so necessary to them, or rather gives them so much pleasure, that they seem unable, as it were, to live without frequent immersions in it.

The habit which this animal has of continually keeping the tail and hind parts in the water, seems to have changed the nature of its flesh. That of the fore parts, till we come to the reins, is of the same quality, taste, and consistency with the flesh of land animals; while the other parts have the smell, savour, and all the qualities of fish. As to the tail, it is an extremity of a fish fixed to the body of a quadruped: in length, generally a foot; in thickness, an inch; and in breadth, five or six inches. It is entirely covered with scales, and has a skin the same as that of a large fish.

The females are said to go four months with young; they bring forth about the close of winter, and their number generally consists of two or three at a time. About this period, the males leave them and go into the fields, where they enjoy all the sweets of the spring. In this season they pay occasional visits to their habitation, but never reside in it; and there the females remain employed in suckling, tending, and rearing their young, which are able to follow them in a few weeks. They then, in their turn, go abroad, where they feed on fish, or on the bark of young trees, and spend their time in the water, or the woods.

Winter is the principal season for hunting them, and it is then their fur is in perfection. After their fabrics are demolished, and a great number taken, their society is never restored; and the few that escape captivity or death, become houseless wanderers, or conceal themselves in some hole under ground, where, reduced to the condition of other animals, they lead a timid life.

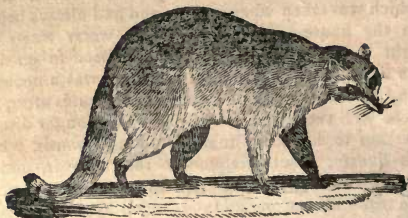
We meet with beavers in America, from the latitude of thirty to sixty degrees north, and even beyond it. In the northern parts they are very common; and the farther we proceed south, their number decreases. The same observation holds with respect to the Old Continent: we never find them numerous but in the more northern countries; and in France, Spain, Italy, Greece, and Egypt, they are exceedingly rare. They were no strangers to the ancients; and by the religion of the Magi it was forbidden to kill them.

Several authors have said, that the beaver, being an aquatic animal, cannot live solely on land. This opinion, however, is erroneous; for the beaver which I had from Canada, which was taken when young, and had always been reared in the house, did not know the water when he was brought to it, but was afraid and refused to go into it. When first plunged into a bason there was a necessity of keeping him in it by force; but a few minutes after, he became so well reconciled to it, that he no longer discovered an aversion to his new situation; and afterwards, when left to his liberty, would frequently return to it, and even roll about in the dirt, and upon the wet pavement. One day he made his escape, and descended by a cellar stair case into the quarries under the Royal Garden; there he swam to a considerable distance on the stagnated water which is at the bottom of those quarries: yet he no sooner saw the light of the torches which were ordered down for the purpose of finding him, than he returned, and allowed himself to be taken without the smallest resistance.

He is familiar without fawning; and when he sees people at table, is sure to ask something to eat. This he does by a little plaintive cry, and by a few gestures of his fore paws. When he has obtained a morsel, he carries it away, and conceals himself, in order to eat it at his ease. When he sleeps, which he does very often, he lies upon his belly. No food comes amiss to him, flesh excepted; and this he constantly refuses, whether raw or boiled. He gnaws every thing he comes near; and it was found necessary to line the tun, with tin, in which he was brought over.

Besides the fur, which is the most valuable article, this animal furnishes a substance that has been of considerable use in medicine; known by the name of *castoreum*. The savages are said to obtain an oil from the tail of the beaver, which they employ as a topical remedy for different complaints; and the flesh, though fat and delicate, is bitter and disagreeable to the palate.

The senses of the beaver are very acute; and so delicate is his smell, that he will suffer no filth to remain near him. When kept too long in confinement, and under a necessity of voiding his excrement, he drops it near the threshold of his prison, and when the door is opened, is sure to push it out.

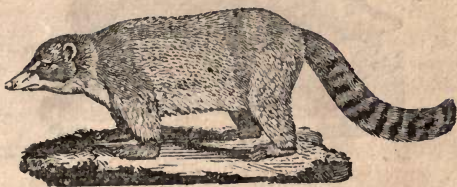


THE RACCOON.

THE Raccoon is an animal about the size of a small badger ; his body is short and bulky ; his fur, fine, long, thick, blackish at the surface, and grey towards the bottom ; his head is like that of the fox, but his ears are round and shorter ; his eyes are large, of a yellowish green, over which is a black and transverse stripe ; his snout is sharp ; his tail thick and tapering, and marked alternately from one end to the other with black and white rings, and is, at least, as long as his body. His fore legs are much shorter than the hind ones, and are armed with five strong, sharp claws.

This animal uses his paws to hold his food while eating ; and his pointed claws enable him to climb trees with great dexterity. He runs up the trunk with the same swiftness that he moves over the plain, and frolics about to the extremity of the branches with great security and ease ; on the ground, indeed, he rather bounds than runs, and his motions, though oblique, are always quick and expeditious.

The racoon is a native of the southern countries of America, and the West-Indies, nor has he ever been found in any part of the Old Continent.

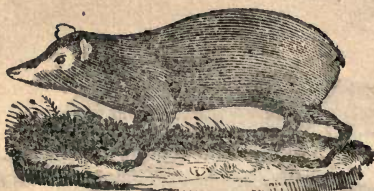


THE COATI.

MANY authors have called this animal, the *Coati-mondi*: it is very different from the animal described in the preceding article, and of a smaller size. Its body, neck, head, and nose, are of a more lengthened form, its upper jaw is an inch, or an inch and a half longer than the lower; and its snout, which is moveable in every direction, turns up at the point. The eyes of the coati are also smaller than the eyes of the racoon; its hair is longer and coarser, its legs are shorter, and its feet longer; but, like the racoon, its tail is diversified with rings; and on each foot, are five claws.

This animal has the practice of eating its own tail, which when not mutilated, is longer than its body: it generally raises it aloft, and can move it with ease in any direction. From this circumstance, we infer, that in those smaller parts, remote from the seat of the senses, the feeling is proportionably less.

As to the coati in other respects, it is an animal of prey, and subsists on flesh and blood; and, like the fox, destroys small animals and poultry, hunts for the nests of little birds and devours their eggs; and it is probably from this conformity of disposition, that some authors have considered it as a species of small fox.



THE AGOUTI.

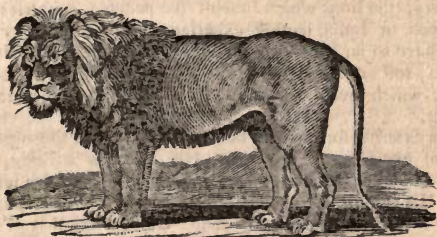
THIS animal is about the size of a hare, and has been improperly considered a kind of rabbit, or large rat. It has the hair and voracious appetite of the hog, eats every thing indiscriminately, and when satiated, hides the remainder, like the dog or the fox, for a future occasion. Its ordinary food consists of the roots of the country, as potatoes, yams, and such fruit as falls from the trees in autumn. It uses its fore paws, like the squirrel, to carry its food to its mouth; and as its hind feet are longer than the fore ones, it runs very swiftly on level ground or up hill, but on a declivity it is in danger of falling. Its sight is excellent, its hearing equal to that of any animal, and when whistled to, it stops to listen. The flesh is dressed like that of a sucking pig, and of such as are well fed, is tolerable food, though it has a peculiar taste and is rather tough.

It is hunted by dogs; and whenever it goes into a sugar ground, where the canes cover the place, it is easily caught. When in the open country, it usually runs with great swiftness before the dogs until it gains its retreat, which is the hole of a tree; out of which nothing can force it but smoke. For this purpose the huntsman burns faggots or straw at the entrance, and conducts the smoke in such a manner as to fill the cavity. While this is doing, the poor little animal seems sensible of its danger, begs for quarter with a most plaintive cry, but seldom quits its hole till the last extremity.

The agouti is a native of the southern parts of America: and is very common in Brasil, St Domingo and the neighbouring islands. To the Old Continent, it is an entire stranger.

CHAP. VIII.

Of Carnivorous Animals continued---The Lion---Tiger---Panther, Ounce, and Leopard,---Jaguar---Cougar---Lynx---Caracal---Hyæna---Civet and Zibet---Genett---and the Ondatra and Desman.



THE LION.

It has been remarked that terrestrial animals are not only larger and stronger in the hot than in the temperate climates, but that they are bolder and more ferocious according to the ardour of the climate in which they live. The lion produced beneath the burning sun of Africa, or India, is above all others the fiercest and most terrible. Our wolves and other carnivorous animals, far from being his rivals, are hardly worthy to be his providers. The lions of America (if they deserve the appellation) are like the climate in which they are produced, considerably milder. That their fierceness depends on the degree of heat is evident, for in the same country, those which inhabit the high mountains where the air is more temperate, are different in disposition from those that dwell in the plains where the heat is excessive,

The lion has no enemy but man; and is brave only in proportion to his conquests. Accustomed to measure his strength with every animal he meets, the habit of conquering renders him intrepid and terrible. Having never experienced the dangerous arts and combinations of man, they have no apprehensions of his power: but meet him with courage, brave the force of his arms, and are not daunted at the opposition of numbers. A lion of the desert will often attack a caravan: and after an obstinate conflict, when he finds himself overpowered, instead of flying, continues to combat, retreat, and face his enemy till he dies. On the contrary, the lions which inhabit the peopled countries of Morocco, or India, having experienced the superiority of man, have so far lost their courage as to be affrighted with a shout: and seldom attack any but the unresisting flocks or herds, which even women and children are sufficient to protect.

The external form of the lion seems to speak the superiority of his internal qualities. His figure is striking, his look confident and bold, his gait proud, and his voice terrible. His stature is not overgrown, like that of the elephant or the rhinoceros: nor is his shape clumsy like that of the hippopotamus or the ox. He is in every respect compact and well proportioned, a perfect model of strength joined with agility.

He manifests his force and muscular power by his prodigious leaps and bounds, by the strong and quick agitations of his tail which alone is sufficient to throw a man on the ground, by the facility with which he moves the skin of his face, particularly that of his forehead, which adds greatly to his physiognomy, or rather to the expressive fury of his countenance, and by shaking his mane, which is not only bristled up but moved and agitated on all sides when he is enraged.

The largest lions are about eight or nine feet long, from the snout to the root of the tail, which of itself is four feet long, and are about four or five feet high. Those of the small size are about five feet and a half long, and three and a half high. The lioness is about a fourth less than the lion.

The lion is furnished with a mane the length of which is in proportion to his age. The lioness is without this appen-

dage. The American animal, which the natives of Peru call *puma*, and to which the Europeans have given the denomination of *lion*, has no mane. It is also much smaller, weaker, and more cowardly than the real lion. In truth, it is very doubtful whether these animals are of the same species.

Both the ancients and moderns allow, that the lion, when newly produced, is not above six or seven inches long; if so, some years must elapse before he can grow to eight or nine feet. They likewise mention, that he is not in a condition to walk till two months after he is brought forth; but, without giving entire credit to these assertions, we may fairly conclude that, from the largeness of his size, he is at least three or four years in growing, and consequently must live seven times three or four years, that is, about twenty-five years.

It is usually supposed that the lion does not possess the sense of smelling in such perfection as most other animals of prey. Too strong a light incommodes him, hence he seldom goes abroad in the middle of the day, but commits his ravages in the night. When he sees a fire kindled near a herd or flock he will not approach it. Though his sight is bad, it is not so faulty as his smell; and unlike the dog and wolf, he rather hunts by the former than by the latter. When hungry, he boldly attacks all animals that come in his way; and as he is very formidable, they seek to avoid him, which often obliges him to skulk that he may take them by surprise. For this purpose, he crouches upon his belly in some thicket or among the long grass which is found in many parts of the forest; and there continues with patient expectation until his prey comes within a proper distance; when he springs upon it with such force as often to seize it at the first bound. If he fails in the first attempt, and in two or three reiterated springs cannot seize his prey, he continues motionless for a time, seems very sensible of his disappointment, and waits for a more favourable opportunity. He devours a great deal at a time, which generally serves him for two or three days. His teeth are so strong, that he easily breaks the bones and swallows them with the rest of the body. It is reported that he can endure hunger a long time, but cannot support thirst

in an equal degree, his temperament being extremely hot; he drinks as often as he meets with water, and laps like a dog. While young and active he subsists by the chase, and seldom quits his native deserts and forests; but when old, heavy, and less qualified for exercise, he approaches the habitations of man, to whom he becomes a dangerous enemy. It is observed, however, that when he sees men and animals together, he prefers the latter to the former; unless he be struck, and then, at no loss to know whence the blow came, he instantly deserts his prey, to revenge the injury. He is said to prefer the flesh of the camel; but is exceedingly fond of that of young elephants, which, from their inability to resist him till they have received their tusks, he easily dispatches when unprotected by the dam; nor are there any animals able to oppose him but the elephant, the rhinoceros, the tiger, and the hippopotamus.

However terrible the lion may be, it is not uncommon for dogs of a large size, when well supported by a proper number of men on horseback, to chase, dislodge, and force him to retire. But, for this enterprize it is necessary, that the dogs, and even the horses, should be previously disciplined; since almost all animals tremble and fly at the very smell of a lion. Though his skin is firm and compact, it is not proof against a musket-ball, or a javelin. Like the wolf, he is frequently taken by stratagem; and for this purpose a deep hole is dug in the earth, over which, when slightly covered with earth and sticks, some living animal is fastened as a bait. When thus entrapped, all his fury subsides; and if advantage be taken of the first moments of his surprise, he may be easily chained, muzzled, and carried off.

The flesh of the lion is of a strong and disagreeable flavour; yet among the Negroes and the Indians it frequently forms a part of their food.



THE TIGER.

THE Tiger, in the class of carnivorous animals, is next the lion ; which, while he possesses all his bad qualities, is a stranger to his good ones. To pride, courage, and strength, the lion adds greatness, and sometimes, perhaps, clemency ; while the tiger, without provocation, is fierce, without necessity, cruel. Thus it is through all the classes of Nature in which the superiority of rank proceeds from that of strength.

The tiger is more to be dreaded than the lion ; and is the scourge of every country he inhabits. Of the appearance of man, and his hostile weapons, he is fearless. Wild animals as well as tame ones fall a sacrifice to him ; he attacks the young elephant, and rhinoceros, and sometimes, with an audacity superior to his nature, braves the lion himself.

The form of the body usually corresponds with the nature and disposition of the animal. The tiger, with a body long, limbs short, a head uncovered, and eyes ghastly and haggard, has no characteristics but those of the basest and most insatiable cruelty. Instead of instinct, he has nothing but an uniform rage, a blind fury ; so blind indeed and unnatural, that he frequently devours his own progeny ; and if the female offers to defend them, he tears her in pieces.

Happy is it that this animal is rare, and that the species is chiefly confined to the warmest provinces of the East. The

tiger is found in Malabar, Siam, Bengal, and in all the countries which are inhabited by the elephant or the rhinoceros.

When he has killed a large animal, as a horse or a buffalo, he does not devour it on the spot, but in order to feast at his ease, drags it to the forest, and that with such speed, that his swiftness is but little retarded by the enormous weight.

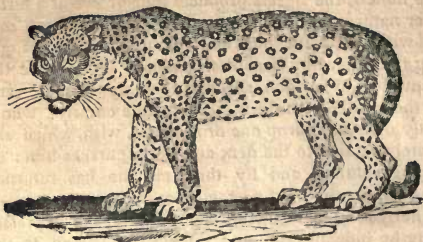
To give a more perfect idea of the strength of this terrible creature, we shall quote a passage from Father Tachard, who was an eye-witness of the combat of a tiger against three elephants at Siam. For this purpose, the king ordered a lofty palisade to be built of bamboo cane, about a hundred feet square; in the midst of which the combatants were to appear. Their heads and part of their trunks were covered with a kind of armour like a mask, which defended those parts from the assaults of the fierce animal they were to engage. As soon, says this author, as we arrived at the place, the largest tiger we had ever seen was brought from his den. He was not at first let loose, but held with cords, so that one of the elephants approaching, gave him three or four blows with his trunk on the back, that he lay for some time as if he were dead. But as soon as he was permitted to have his liberty, although the first blows had greatly abated his fury, he made at the elephant with a loud shriek, and aimed at seizing his trunk; which the elephant, wrinking up with great dexterity, received him on his great teeth, and tossed him into the air. This so discouraged the furious animal that he no more ventured to approach the elephant, but made several circuits round the palisade, often attempting to fly at the spectators. Shortly after, a second and then a third elephant was sent against him, which struck him so terribly with their trunks, that he once more appeared dead; and they would certainly have dispatched him, had not a stop been put to the combat.

The tiger, of which Father Gouie has communicated to the Academy of Sciences an anatomical description, composed by the Jesuit-Fathers at China, seems to belong to the true species, as also that which the Portuguese have distinguished by the name of the *Royal Tiger*, which is as large as a horse. According to Dellon, there is no country of India in which tigers so much abound as Malabar; the *Royal Tiger* is the largest, though not so common.

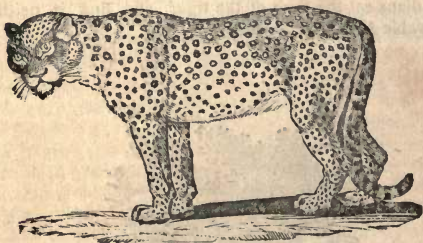
The species of the tiger is much rarer than that of the lion. Like the lioness, the tigress produces four or five at a birth. From her nature, she is fierce at all times; but when surrounded with her infant progeny, and in the smallest danger of losing them, her fury becomes extreme. To oppose the daring invaders of her den, she braves every danger; and pursues the spoiler with the most inveterate enmity; who is frequently obliged to drop one of the cubs, with which she immediately returns to the den, and again pursues him: he then drops another, and by the time she has returned with that, he, for the most part, escapes with the remainder. Should her young be torn from her entirely, she expresses her agony by hideous cries, and follows the person to the very town, or ship, in which he may have taken refuge, and dares him to approach her.

The skins of these animals are much esteemed in the east, particularly in China; where the Mandarines cover their seats of justice with them, and their cushions in winter. The Indians eat the flesh of the tiger, and find it neither disagreeable nor unwholesome.





THE PANTHER.



THE LEOPARD.

THE first of these species, which exists in the Old Continent, is the *Large Panther*, which we shall simply call *Panther*. The Greeks distinguished it by the name of *Pardalis*; the ancient Latins, first by the name of *Panthera*, afterwards by that of *Pradus*, and the modern Latins by the name of *Leopardus*. The length of his body, from

the tip of the nose to the root of the tail, at his full growth, is five or six feet; and his tail above two feet. His skin is of a yellow hue, more or less dark on the back and sides, and whitish under the belly; and is marked with black spots in the form of beads; the greater number of which have one or more spots in the centre, of the colour with the extremity of the ring. Some of them are oval, others circular; and they are frequently above three inches in diameter.

The second species is the *Small Panther* of Oppian, which our modern travellers have improperly called *Ounce* or *Onza*, from *Lynx* or *Lunx*. To this animal we shall continue the name of *Ounce*, which, as it has some affinity to the lynx, seems to be properly applied. He is about one-third less than the panther, or near the size of the lynx; his hair and tail, are longer than those of the panther; the latter frequently measuring above three feet. The hair of the ounce is of a whitish grey upon the back and sides, and of a grey still whiter under the belly; whereas the back and sides of the panther are yellow more or less deep. In both, however, the spots are nearly of the same form and size.

The third species is not mentioned by the ancients, as it belongs to Senegal, Guinea, and other southern countries which they had not discovered. This animal we shall call *Leopard*; a name which has been improperly applied to the large panther, but which, following the example of most travellers, we shall never use unless to denote the above mentioned animal of Senegal. He is somewhat larger than the ounce, but considerably smaller than the panther, being only four feet long; the tail measures two feet or two feet and a half. On the back and sides the hair is of a yellow colour more or less deep; under the belly it is whitish; the spots are annular, but smaller, and less regularly disposed.

As each of these animals is different from the other, so each forms a distinct species. Our furriers call the skins of the first species *panther skins*; a name which we shall not change. Those of the second they call *African tiger-skins*, which, being an equivocal name, we have set aside and adopted that of *ounce*. In short, they improperly call *tiger-skins*, the skins of the animal which we have here denominated the leopard.

The species of the ounce appears to be more numerous as well as more general than that of the panther. In Barbary, Arabia, and the southern parts of Asia, Egypt perhaps excepted, it is very common. It is known also in China, where it is distinguished by the name of *binen-pao*.

The ounce is easily tamed, and is employed in the chase in the hot climates of Asia, where the dog is not to be found, unless introduced from other parts; and then he not only loses his voice, but his instinct. Besides, these animals are alike remarkable for their antipathy to dogs, which they seize in preference to every other animal.





THE JAGUAR.

THE Jaguar resembles the ounce in disposition and size, and for the most part in the form of the spots with which his skin is diversified. He is less terrible and less ferocious than the panther and the leopard; the ground of his colour, like that of the latter, is a bright yellow, and not grey like the ounce. His tail is shorter than that of either of those animals; his hair longer than the panther's, and shorter than the ounce's. It is frizzled while he is young, but smooth and straight when he is full grown.

The Jaguar lives by prey; but a lighted brand will put him to flight, and deprive him of all courage, and vivacity. He appears to partake of the indolence arising from the nature of the climate; nor does he ever discover any activity or alertness, but when pressed by hunger.

Almost all the authors who have written of the New World, have mentioned this animal; some under the name of *tiger*, or *leopard*, others under the names it bears at Brasil, Mexico, &c. They also speak of another animal of the same genus, and perhaps of the same species, under the name of *jaguar*, which we have distinguished from the jaguar in our enumeration. Whether they are two distinct species, or only varieties of the same, I cannot positively affirm, having seen only one of the kinds.

The jaguar is found in Brasil, Paragua, Tucuman, Guiana, the country of the Amazons, Mexico, and in all parts of South America. The jaguaret appears to have been always more rare, or has at least inhabited such places as are more distant from the haunts of men; and the few travellers who have mentioned him, have only drawn their accounts from those of Marcgravius and Piso.

THE COUGUAR.

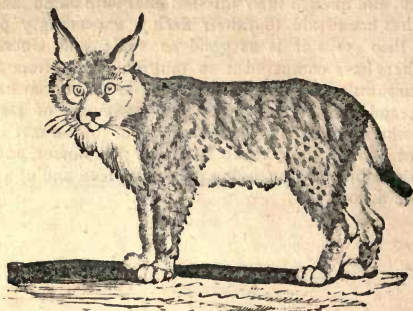
THE Couguar is as long but not so thick as the jaguar; he has a small head, a long tail, and short hair, which is of a lively red colour, intermixed with a few blackish tints, particularly on the upper part of the back. He is neither marked with long stripes, like the tiger, nor with round and full spots, like the leopard, nor with annular spots, like the panther and the ounce; but his chin, neck, and all the inferior parts of his body are whitish. Though he is not so strong as the jaguar, he is as fierce, and perhaps more cruel; he also appears to be more greedy of prey; which, when once seized, he does not relinquish till he has fully glutted his voracious appetite.

This animal is not uncommon in Guiana. Formerly, couguars were known to swim over in numbers to the island of Cayenne to attack and devour the flocks, and were considered as a scourge to the colony; but, by degrees, the settlers lessened their number, and at length expelled them entirely.

The couguar, by the agility of his body and length of his legs, seems better calculated to run, and to climb trees, than the jaguar. They are equally remarkable for sloth and cowardice, particularly when satiated with prey; and are seldom known to attack men, except they find them asleep. They delight in the lofty shades of forests, where they hide themselves in the covert of some thick tree, in order to dart

forth on such animal as pass by. Though they live only upon prey, and quench their thirst oftener with blood than water, it has been said that their flesh is exceedingly palatable. Piso says it is as good as veal; and Charlevoix and others have compared it to mutton. Yet, from the above circumstances, it is hardly credible that it can be well tasted; and therefore I prefer the testimony of Desmarchais, who says, that the best thing about this animal is the skin, of which they make housings for horses, and that his flesh is of no value, being generally lean and of a disagreeable flavour.





THE LYNX

THE Lynx is an animal commonly found in cold climates. It was known to the Greeks and Latins; Pliny says, that the first which were seen in Rome, were brought from Gaul in the time of Pompey. At present, they are not seen in France, except a few belonging to the Alpine and Pyrenean mountains. But the Romans, under the name of Gaul, comprehended several northern countries; besides, modern France is far from being so cold as ancient Gaul.

The most beautiful skins of the lynx are those of the *lupus-cervarius*, brought from Siberia, those of the *felis-cervarius*, from Canada. In Europe, they are compared to a wolf in size; and in Canada to a wild cat.

The lynx, the sight of which the ancients said, was so sharp as to penetrate opaque bodies, and the urine of which possessed the marvellous property of hardening into a solid substance a precious stone, called *lapis lincurius*, is an animal which never existed. To the true lynx this imaginary one has no affinity, but in name; we must not, therefore, like most Naturalists, attribute to the former, which is a real being, the properties of the imaginary one, the existence of

which, Pliny himself does not seem disposed to believe, and which he classes with the sphynx, the pegasus, and other prodigies or monsters the produce of *Æthiopia*.

Our lynx possesses not the wonderful quality of seeing through walls; but has bright eyes, a mild aspect, and upon the whole, an agreeable and lively appearance. Its urine does not produce precious stones; but like the cat, which it resembles and imitates, covers it with earth.

The lynx has short legs, and is generally about the size of the fox. It differs from the panther and the ounce in the following particulars: it has long hair, its marks or spots are of a colour less lively, and badly disposed; its ears are surrounded at the extremity by a stripe or rather tuft of black hair; its tail, which is much shorter, is black at the tip; its eyes have a whitish cast; and its countenance has something in it more mild. The skin of the male is more beautifully marked than that of the female. It does not walk or run like the wolf in a progressive motion, but leaps and bounds like the cat. It gains its sole subsistence by prey, which it will pursue to the very tops of trees; neither can the wild cat, the martin, the ermine, nor the squirrel, escape it. It also seizes birds; and lies in wait for the stag, the roebuck, and the hare, and often with one bound seizes them by the throat. When in possession of its prey, it first sucks the blood of the animal, and then lays open the head in order to devour the brains; it then abandons the victim, goes in quest of fresh prey, and is seldom known to return to the former; a circumstance which has given rise to the vulgar remark, that of all animals the lynx has the shortest memory. The skin of this creature changes its colour according to the season and climate. In winter it is in every respect better than in summer; and its flesh, like that of all beasts of prey, is improper food.



THE CARACAL, OR SYAGUSH.

THE Caracal, though it resembles the lynx in size, in the formation of its body, the aspect of its head, and the almost singular characteristic of a stripe of black hair at the extremity of the ears, I am inclined to treat of it as an animal of a different species.

The caracal is not spotted like the lynx, its hair is rougher and shorter, its tail larger, and of an uniform colour; its snout is longer; in appearance it is less mild, and in disposition, fiercer. The lynx is an inhabitant of the cold, or rather of the temperate regions. The caracal, on the other hand, is only found in hot countries; and it is more from their difference in disposition and climate that I have judged them to be of two different species, than from the analogy of their appearance.

It is common in Barbary, Arabia, and all those countries which are inhabited by the lion, the panther, and the ounce. Like them it depends on prey for its subsistence; but from its inferior size and strength, has much difficulty in procuring it: hence, in general, it subsists on the leavings of the

more potent carnivorous animals. It keeps at a distance from the panther, because that animal exercises his cruelty even after he is satisfied with food ; but follows the lion, who, when the immediate cravings of his appetite are gratified, is of a pacific disposition. From the refuse of this noble animal the caracal frequently enjoys a comfortable meal. This animal, for these reasons, has been called " the lion's guide," the " lion's provider ; and that the lion, the smell of which is far from being acute, is said to employ it to find prey for him, of which, it enjoys the remains for its trouble, when its master is satisfied.

The caracal is about the size of a fox, but much fiercer, and stronger. It has been known to attack, tear in pieces, and destroy in a few minutes, a large dog that exerted himself to the utmost. It is very difficult to tame it, yet, if taken when very young and reared with care, it may be trained to the chase, to which it is by nature inclined, and in which it is sure to succeed, provided it is not let loose but against such animals as are unable to resist it. In India, they make use of this animal to take hares, rabbits, and even large birds, all of which it seizes with singular address.





THE HYÆNA.

THE characteristics of the Hyæna are so singular and striking, that it is hardly possible to be deceived by them. It is, perhaps, the only quadruped which has but four toes on each of its feet. Like the badger it has an aperture under its tail which does not penetrate into the interior parts of the body. Its ears are long, straight, and bare; its head is more square and shorter than that of the wolf; its legs, the hind ones especially, are longer; its eyes are placed like those of the dog; the hair of its body and mane are of a dark grey, with a small intermixture of yellow and black disposed in waves; and though its size is equal to that of the wolf, it has a contracted appearance.

This solitary creature resides in the caverns of mountains, clefts of rocks, or in dens, which it has formed for itself in the earth. Though taken very young, it is incapable of being tamed. It lives, like the wolf, by depredation; is a stronger animal, and seemingly more daring. It sometimes attacks men, carries off cattle, follows the flocks, breaks open the sheep-cots by night, and ravages with an insatiable vor-

rocity. Its eyes are keen and piercing, and it is said to see best in the night. If we may credit the Naturalists who have treated of this animal, its cry resembles the sobs or reachings of a man in a violent fit of vomiting; but, according to Kœmpfer, who was an ear witness of it, it sounds like the lowing of a calf.

The hyæna defends itself against the lion, is not afraid of the panther, and attacks the ounce which is incapable of resisting it. When at a loss for other prey, it scrapes up the earth with its feet, and devours the carcasses of animals, and men; which, in the countries it inhabits, are interred promiscuously in the fields. We find this creature in almost all the hot climates of Africa, and Asia; and it seems probable that the animal called *farasse*, at Madagascar, which resembles the wolf in figure, but is larger, stronger, and more cruel, may be the *byæna*.

Few animals have had more absurd stories told of them than the hyæna. The ancients represented it as male and female alternately. The circumstance, which gave rise to this fable, is the opening in the form of a cleft, which the male and female have independently of the parts of generation. It also has been affirmed, that this creature can imitate the human voice, that it remembers the names of the shepherds, calls to, charms, and renders them motionless; that it gives chase to the shepherdesses, makes them forget their flocks, be distracted with love, &c. All these things might surely happen without the intervention of an hyæna; therefore, to avoid the reproach due to Pliny in compiling and publishing such fables, I conclude the description.



THE CIVET AND ZIBET.

Most Naturalists have been of opinion, that there is only one species of animals that furnishes the perfume known by the name of *civet*. I have seen two, which, though they resemble each other in the essential affinities of conformation, differ in so many other characteristics, that there is sufficient reason to consider them as two distinct species.

To the first of these animals I have appropriated its original name of *civet*; and to the second I have given that of *zibet*, which differs from the former in having a body longer and smaller, a snout more slender, flatter, and somewhat concave at the upper part; its hair is much shorter and softer; and it has no mane, no black under the eyes, or upon the cheeks like the civet. Some travellers suspected that there were two species of civets; but no person had so distinguished them as to be able to describe them with sufficient accuracy.

These animals, though they have been called musk or civet-cats, resemble the fox rather than the cat, especially in the head. Their coats are diversified with stripes and spots; a circumstance which has occasioned some, who had only seen them at a distance, to mistake them for small panthers, from which they differ in every other respect. The perfume of the civet is remarkably strong, and that of the zibet, to an extreme.

This humour is found in the opening which each of these animals has near the parts of generation; and though the o-

dour is strong, it is agreeable, even when it issues from the body of the animal. The perfume of the civet we must not confound with musk, which is a sanguineous humour obtained from an animal altogether different from either the civet or the zibet. The animal that furnishes the musk, is a kind of roe-buck without antlers, or goat without horns; nor does it possess any property in common with the civet but that of furnishing a strong perfume.

Civets, though natives of the hottest climates of Africa, and Asia, are capable of living in temperate, and even in cold countries, if carefully defended from the injuries of the air, and provided with delicate and succulent food. In Holland, where no small emolument is derived from their perfume, they are frequently reared; and the perfume of Amsterdam is esteemed preferable to that which is brought from the Levant, or the Indies, which is generally less genuine. That imported from Guinea would be the best, were it not that the Negroes, as well as the Indians and the people of the Levant, adulterate it with mixtures of laudanum, storax, and other odorous drugs.

Those who breed these animals for the sake of this article, keep them in long, narrow boxes, which open behind, and in which they cannot turn. The person, who is employed to collect it, opens each box twice or thrice a week; drags the animal backwards by the tail, and keeps it in this position by a bar before, and with a little spoon takes the civet out into a vessel, which is afterwards closely stopped.

The quantity, which a single animal affords, depends greatly upon its appetite and the quality of its nourishment. It furnishes more in proportion as it is more delicately and abundantly fed. Raw flesh hashed small, eggs, rice, small animals, birds, young fowls, and particularly fish, are its favourite food.

The civet is a wild, fierce animal, and though sometimes tamed, is never very familiar. Its teeth are strong and sharp; its claws, feeble and blunt. It is light and active, and lives by prey; pursuing birds and such small animals as it is able to overcome. They are sometimes seen stealing into yards and out-houses, like the fox, in order to carry off poultry. Their eyes shine in the night; and it is very probable that they see better by night than by day. When a

mal food fails, they subsist on roots and fruit. They very seldom drink; do not inhabit humid ground; but remain chiefly in burning sands, and arid mountains.

THE GENETT.

THE Genett is an animal smaller than the civet. It has a long body, short legs, a sharp snout, and a slender head. Its fur, which is exceedingly smooth and soft, is of an ash-colour, glossy, and marked with black stripes, which are separate upon the sides, but unite on the back. It has also upon its neck a kind of mane, which forms a black streak from the head to the tail, which last is as long as the body, and is marked with seven or eight alternate rings of black and white, from the root to the tip.

The genett has under its tail, and in the very same place with the civet, an opening in which is separated a kind of perfume resembling civet, but less strong and apter to evaporate. It is an animal very like the martin, not only in the form of its body, but also in disposition and habit, and from which it seems chiefly to differ in being more easily tamed.

THE ONDATRA AND DESMAN.

THE Ondatra and Desman are two animals which must not be confounded, though they have been denominated *musk-rats*, and have a few common characteristics.

The ondatra or musk-rat of Canada, differs from the desman in having its toes separated from each other, its eyes very conspicuous, and a very short snout. The desman or musk-rat of Muscovy, on the contrary, has the toes of its hind feet united by a membrane. The tail of both is flat; and not only in this circumstance, but in a number of essen-

tial characteristics, they differ from the pilori or musk-rat of the Antilles.

The ondatra is of the size of a small rabbit, and form of a rat. Its head is short and similar to that of the water-rat; its hair is soft and glossy, with a very thick down underneath, nearly like that of the beaver. Its tail is long, and, though of a different form, is covered with little scales in the same manner as those of other rats. Its ears are very short, but not bare like those of the domestic rat.

The striking singularities which have been remarked in the ondatra are, the force and great expansion of the muscles of its skin, the suppleness of its false ribs, which permits so considerable a contraction of the body, that it is known to obtain an easy entrance into holes too narrow for the admission of animals much smaller than itself. The manner too in which the female voids her urine is a very striking characteristic; the urethra not terminating as in other quadrupeds, but at a hairy eminence situated over the os pubis. The testicles also, which, as in other rats, are situated on each side of the anus, become prodigiously large while the ardour for propagation lasts. Add to these, that the vessels, which contain the musk or perfume under the form of a milky humour and which adjoin the parts of generation, undergo the same change; but decay soon after, and are at length totally effaced. The change in the bags, which contain the perfume, is effected more quickly, as well as more completely than that of the parts of generation: they are common to both sexes, and contain a very copious milky substance while the animals are hot.

From the ondatra being a native of the same country with the beaver, they have been often compared with each other; as to figure and colour. In disposition and instinct also, they bear a considerable resemblance. Like the beavers, the ondatras live in society during winter; form little dwellings about two feet and a half, and sometimes more in diameter; and cover them with a kind of ceiling about a foot thick; and the materials of which they are composed, are rushes and certain herbs interwoven, and consolidated with clay, which they previously prepare for that purpose, with their feet. They do not resort to these habitations, in

order to sleep for four or five months, like the marmots, but for shelter from the inclemency of the weather.

These animals breed once a year, and generally produce five or six at a time. So strong are their fore teeth, and so excellently calculated for gnawing, that when one of them is shut up in a box, it presently makes a hole, even through the hardest wood. and effects its escape.

They are little inclined to ferocity, and when taken young, are easily tamed. In the very early period of life they are also, which might not be expected, exceedingly handsome; for then the long and almost bare tail, which renders their figure very disagreeable afterwards, is very short. They play with all the innocence and sprightliness of young cats; never bite, and might be easily reared, were it not for their noxious smell.

CHAP. IX.

Of the Peccary, or Mexican Hog---Ternat Bat---Spectre---Flying Squirrel---Grey Squirrel---Palm Squirrel, and those of Barbary, &c.---Ant Eaters---Short and Long-Tailed Manis---Armadillo---Spotted Cavy---Opossum---Marmose---and the Cayopolin.

THE PECCARY OR MEXICAN HOG.

AMONG the animals of the New World, we meet with few species more numerous, or more remarkable, than that of the Peccary or Mexican Hog. At the first glance, we see a resemblance in this animal to our wild boar, or rather the hog of Siam, but it is of a distinct species, and refuses to engender with either. It differs from the hog in a number of characteristics, both external and internal: it is less corpulent, and its legs are shorter; in the stomach and intestines there is a difference of conformation; it has no tail, and its bristles are much stronger than those

of the wild boar; and lastly, it has, upon that part of the back which borders upon the buttocks, an opening from which there is discharged an ichorinous humour of a very disagreeable smell. The peccary is the only animal which has an opening in this region of the body. In the civet, badger, and genett, the reservoir for the perfume is situated beneath the parts of generation; and in the musk animals, under the belly.

The peccary has pretty much the same habits and natural inclinations as the hog, and may be domesticated. It feeds upon the same aliments; and its flesh, though more dry and lean than that of the hog, is not unpalatable.

These animals are extremely numerous in South America, where they may be seen in herds of two or three hundred each; and unite, like hogs, in the defence of each other. They are particularly fierce when any attempt is made to rob them of their young: surround the plunderer, attack him without fear, and frequently his life falls a victim to his rashness.

In its native country, it is more fond of the mountainous than of the low and level grounds; it delights neither in marshes nor mud, like our hogs; but keeps among the woods, where it subsists upon wild fruit, roots, and vegetables. It is an enemy to the lizard, toad, and all the serpent kinds with which the uncultivated forests of the New Continent abound. As soon as it perceives a serpent, or a viper, it seizes it with its fore hoofs and teeth, fleas it in an instant, and devours its flesh.

Like the hog, it is very prolific. The young ones follow the dam, and do not separate from her till they have attained maturity. If taken young they are easily tamed, and soon lose all their natural ferocity: yet never display any remarkable signs of docility. They continue only to do no mischief; and may be permitted to run tame, without any dangerous consequences. They seldom stray far from home; return of themselves to the sty, and do not quarrel with each other, except when they happen to be fed in common. When enraged, they draw their breath with great force, and their bristles point upwards, and do not resemble the bristles of the wild boar so much as the sharp armour of the hedge-hog.

THE ROUSSETTE OR TERNAT BAT,* THE ROUGETTE,† AND
THE VAMPIRE OR SPECTRE.§

THE Roussette, and Rougette, though so like each other, form two distinct species; and ought not, in my opinion, to be classed together. The latter differs from the former in the size of its body, and the colour of its hair. The roussette, the hair of which is of a reddish brown, is nine inches long from the tip of the nose to the root of the tail, and three feet broad, when the membranes, which serve it for wings, are fully extended. The rougette, the hair of which is of a reddish ash-colour, is not more than five inches and a half long, and two feet broad; and its neck is half-encircled with a stripe of hair of a lively red, intermixed with orange-colour, of which we perceive no vestige on the neck of the roussette. They belong nearly to the same hot climates of the Old Continent; and are met with in Madagascar, the Island of Bourbon, Ternato, the Philippine, and other Islands of the Indian Archipelago, where they abound more than in the neighbouring continents.

In the hot countries of the New World, we likewise meet with another flying quadruped, of which we know not the American name, therefore have affixed that of Spectre or Vampire, because it sucks the blood of men and animals when asleep, without awaking them. This American animal is of a species different from the two former, which are to be found only in Africa, and the southern parts of Asia.

THE Spectre is smaller than either the rougette, or roussette: the former, when it flies, appears of the size of a pigeon; the second of the size of a raven; and the third of the size of a large hen. Of the roussette, and rougette, the head is tolerably well shaped; the ears are short and nearly like those of a dog. Of the spectre, on the contrary, the nose is longer; the aspect hideous as that of the ugliest bat; the head unshapely, and mounted with large ears, very open,

* Vulgarly called the *Flying Dog*, and, by the generality of Naturalists, the *Great Bat of Madagascar*.

† Vulgarly called the *Red-necked Flying Dog*.

§ An American animal, which has hitherto been known under the vague name of the *Great American Bat*, or *Flying Dog of New Spain*.

and straight; its nose is disfigured; its nostrils resemble a funnel, and have a membrane at the top, which rises in the form of a sharp horn or cock's comb, and adds greatly to the deformity of its face.

There is no doubt, therefore, but that the species of the spectre is different from those of the roussette and rougette. It is an animal not less mischievous than it is deformed; it is the pest of man, and the torment and destruction of animals. In confirmation of this truth, a more authentic testimony cannot be produced than that of M. de la Condamine. "The bats," says he, "which suck the blood of horses, or mules, and even of men, when they do not guard against them by sleeping under the shelter of a pavilion, some of which are of a monstrous size, are a scourge common to most of the hot countries of America. At Borja, and several other places, they have entirely destroyed the large cattle which the missionaries brought thither, and which had begun to multiply."

The roussette and rougette are larger, stronger, and perhaps more mischievous than the vampyre; and it is by open force, and in the day as well as by night, that they commit hostilities. Fowls and small animals are the objects of their destructive fury; they also attack men and bite their faces most cruelly; but no traveller has accused them of surprising either while asleep, and sucking their blood.

These bats are carnivorous and most voracious animals; and in a dearth of flesh or fish, feed on vegetables and fruit of every kind; and as they are fond of the juice of the palm-tree, it is easy to take them by placing in the neighbourhood of their retreat a few vessels filled with palm-tree water, or any other fermented liquor. They fasten to, and suspend themselves from trees with their claws; are usually seen in troops, and oftener by night than by day; and shun places that are much frequented: their favourite residence being in the deserted parts of islands.

I have frequently thought it worth while to examine how it is possible that these animals should suck the blood of a person asleep without causing, at the same time, a pain so sensible as to awake him. Were they to cut the flesh with their teeth or claws, the pain would effectually rouse any of the human species, however sound. It must, therefore, be

with their tongue that they make such minute apertures in the skin as to imbibe the blood through them, and open the veins without causing pain.

I have not had an opportunity of observing the tongue of the vampyre; but that of several roussettes, which Mr Daubenton has attentively examined, seems to indicate the possibility of the fact. It is sharp and full of prickles directed backwards; and it is probable, that these prickles or points, from their extreme minuteness, may enter the pores of the skin, enlarge, and penetrate so deep, as to command a flow of blood by the continued suction of the tongue. These circumstances are perhaps exaggerated, or erroneously related, by the writers who have transmitted them to us.





THE FLYING SQUIRREL.

THE Flying Squirrel is of a particular species, and resembles, in some degree, the squirrel or the rat. He is more common in America than Europe, where he is seldom seen, except in Lithuania and Russia. This little animal dwells in trees, like the squirrel; goes from branch to branch; and when he leaps, the skin, which hangs loose on both sides of his body, is stretched forwards by his fore legs, and backwards by the hind legs, and increases the surface of his body, without adding to its weight, and consequently retards the acceleration of his fall; so that this animal can, at one leap, bound to a great distance. His motions are neither like the flight of a bird, nor the flutter of a bat; but made by striking the air with repeated vibrations.

The flying squirrel is easily tamed; and must be kept in a cage, or tied with a small chain. He feeds upon bread, fruit, and seeds; is remarkably fond of buds and shoots of the birch and pine trees, but does not seek nuts and almonds like the squirrel. He makes a bed of leaves, in which he either buries himself or lies upon in the day time, and leaves it in the night, or when pressed by hunger. As he has little agility, he becomes easily the prey of martins, and other animals which climb trees; so that the species is not numerous, although they have commonly three or four young ones at a time.

THE GREY SQUIRREL.

THE Grey Squirrel is found in the northern parts of both Continents, and is in shape like the common squirrel, but larger. The colour of his hair is a light or deep grey; and his ears are not so hairy towards the extremities as those of our squirrels. Many authors think the species is different in Europe and America; that the grey squirrels of Europe are of the common kind, and that they change their colour, according to the season, in the northern climates. Without denying this assertion, which is not sufficiently proved, we consider the grey squirrel of Europe and America as the same animal, and as a species distinct from that of the common squirrel of both Continents.

We have very little information with regard to the grey squirrel. Fernandez says, that the grey or blackish squirrel of America, dwells commonly in trees, particularly pines; feeds upon fruit and seeds; and lays up stores for winter, in some hollow tree, whither he retires during that season. The grey squirrel also differs from the others in making his nest at the tops of trees like birds.

THE PALM SQUIRREL, AND THOSE OF BARBARY AND SWITZERLAND.

THE Palm Squirrel is as large as a rat. He lives upon Palm trees, from which he derives his name. Some call him the palmist rat, and others the palm-tree squirrel; but as he is neither of the species of the rat nor squirrel, we shall call him palmist. His head is nearly of the same form with that of the short-tailed field mouse, and covered with rough hair. His long tail, which is covered with hair longer than that of the body, but much shorter

than the hair of the squirrel's tail, does not lie on the ground like the rat's, nor on his back as the squirrel's does, but is carried in an erect position. His back is variegated with white and brown stripes, which distinguish the palmist from all other animals, except the squirrels of Barbary and Switzerland.

With respect to the squirrel of Barbary, as he is of the same continent, climate, size, and nearly of the same form with the palmist, one should be inclined to think them of the same species, with some variety; yet there is reason to believe that they are different animals. We have seen all the varieties in the king's cabinet. The squirrel of Barbary has the head and forehead more crooked, the ears longer, and the tail more bushy than the palmist: in short, he is more like a rat than a squirrel. The squirrel of Barbary has four white stripes, the palmist only three. The white stripe is on the palmist's back bone; that of the squirrel of Barbary, on the same part of his body, is brown and red. These animals, indeed, have nearly the same habits, and are of the same nature as the common squirrel. They are of a pretty figure: their coat, with white stripes, is more valuable than that of the squirrel; their shape is shorter, body lighter, and motions quicker. The palmist and the squirrel of Barbary, dwell on trees like the common squirrel, but the Swiss squirrel lives upon the ground, and like the field mouse, forms a retreat that the water cannot penetrate. He is also less docile and gentle than the others; bites without mercy, (except lately tamed,) and is more like a rat, or a field-mouse, by instinct and nature, than a squirrel.



[THE TAMANOIR, THE TAMANDUA, AND THE FOURMILLER,
OR ANT-EATER.

SOUTH America produces three species of animals, with a long snout, small mouth, no teeth, and tongues remarkably long and round; with which they penetrate the ants nests, which are their principal food. The first of these ant-eaters is that which the Brasilians call tamandua guacu, or great tamandua, to which the French, who are in America, have given the name of tamanoir. This animal is about four feet from the extremity of the snout to the origin of his tail; his head is fourteen or fifteen inches long, his snout stretches out to a great length; his tail, two feet and a half long, is covered with rough hair, which is above a foot long. His neck is short, head narrow, eyes black and small, ears round, tongue thin, and more than two feet long, which he folds again in his mouth, after he draws it entirely out. His legs are but one foot in length: the fore-legs are a little longer and more slender than those behind: he has round feet: the fore-feet are armed with four claws, the two middle ones are the longest; and those behind have five claws. The hair of his head and body is black and white; and he turns his tail up on his back, which covers his whole body, when he is inclined to sleep, or wishes to shelter himself from the rain or the heat of the sun. When irritated, he waves it frequently and hastily, but when composed, it hangs down and sweeps the ground as he goes. The tamanoir

walks so slowly, that a man can easily overtake him : his feet seem less calculated to walk than to climb, and to fasten round bodies ; and he holds a branch or a stick so fast, that it is impossible to snatch it from him.

The second of these animals is that which the Americans call *Tamandua* ; he is much smaller than the *tamanoir* ; is not above eighteen inches from the extremity of the snout to the rump ; his head is five inches long, snout crooked, and flat and long below. He has a tail ten inches long, without hair at the end ; his ears are erect and about an inch long, his tongue is round, and eight inches long, placed in a sort of gutter or hollow canal within the lower jaw ; his legs are not above four inches long ; his feet are of the same form, and have the same number of claws as those of the *tamanoir* : he also climbs, holds a branch or a stick, and walks like him in every respect. He cannot shelter himself with his tail, it being almost bare ; the hair of the fore-part is shorter than that of the *tamanoir* ; and when he sleeps, he hides his head under his neck and fore-legs.

The third of these animals is that which the Naturalists of Guiana call *Ouatiriouaou*, to which we have appropriated the name of *Fourmiller*, or ant-eater, to distinguish him from the *tamanoir* and *tamandua*. He is much smaller than the *tamandua*, being not above six or seven inches long from the extremity of the snout to the tail ; his head is two inches long ; the snout is not near so long as that of the *tamanoir*, or the *tamandua* ; his tail is seven inches long, but is bent and bare at the end ; his tongue is narrow, long, and flat ; his neck is almost bare, the head is large in proportion to the body ; his eyes are placed low, at a little distance from the corners of the mouth ; his ears are small, and hidden by the hair ; his legs are but three inches long ; his fore-feet have no more than two claws, of which the exterior is much longer than the interior ; his hind feet have four claws. He feels smooth, his colour is shining and diversified with red and yellow ; his feet are not made to walk, but climb, and take hold of the branches of trees, on which he hangs himself by the extremity of his tail.

These animals, so different in the size and proportions of the body, have many things in common, with regard to conformation and natural instinct. They all feed upon ants, and

suck honey and other liquid and viscous substances: gather crumbs of bread and small pieces of meat with great dexterity; are easily tamed and domesticated; can subsist a long while without food; do not swallow all the liquor they take into their mouth, a part of which issues through their nostrils; they commonly sleep in the day time, and change their station in the night: and are so slow, that a man may overtake them easily whilst running in open ground. The savages eat their flesh, which has a disagreeable taste.

The tamanoir looks, at a distance, like a great fox, and for that reason some travellers call him the American fox. He is strong enough to defend himself against a large dog, and even a jaguar. When he is attacked, he fights standing on his hind legs, like the bear, and makes use of his fore claws, which are murdering weapons, for his protection. He frequently lies on his back to use his hind legs, and in this situation is almost invincible, for he seldom loses his life; and after he has put his adversary to death he keeps his hold a long time. He is covered with long bushy hair, and a very thick skin; and his flesh is remarkably hard.

The tamanoir, tamandua, and fourmiller, are only natives of the hottest climates of America. They are found in Brasil, Guiana, the country of the Amazons, &c. and do not breed in Canada, nor any of the frozen regions.





THE PANGOLIN AND PHATAGIN; OR THE SHORT AND LONG-TAILED MANIS.

THESE animals are commonly known by the name of scaly lizards; but we reject this denomination, 1. because it is a compound, 2. because it is ambiguous, and applied to both species; and 3. because these animals are not only of another kind, but even of another class than the lizards, which are oviparous reptiles, while the pangolin and phatagin are viviparous quadrupeds.

All lizards are covered, even under the belly, with a sleek speckled skin, like scales, but the pangolin and phatagin have no scales under their throat, on their breast, or belly. The phatagin, like other quadrupeds, has hair on the under parts of the body; but the pangolin has nothing but a smooth skin without hair. The scales, with which the other parts of the body of these two animals are covered, are moveable like the prickles of the porcupine; and are so large, hard, and sharp, that they frighten and discourage all animals of prey. It is offensive armour, it wounds while it resists.

The most cruel and voracious beasts, such as the tiger, and the panther, make but useless efforts to devour these armed animals; they tread upon, and roll them, and when they attempt to seize them, are grievously wounded. In short, they can neither terrify them by violence, nor crush them with their weight.

When the pangolin and phatagin contract themselves, they do not, like the hedge-hog, assume a globular, but an oblong figure; and their thick and long tails, the exterior parts of

which carry their own defence, and save these animals from being seized by their enemies; encircle their bodies, and compose a formidable piece of armour, which is covered with scales equally hard and strong, with those which cover their bodies.

The pangolin, or short-tailed manis, is larger than the phatagin, or long tailed; his fore feet are covered with scales, but the phatagin's feet, and part of his fore-legs have none, being only clothed with hair. The pangolin has also larger scales, thicker, more convex, and not so close as those of the phatagin, which are armed with three sharp points. The scales of the pangolin, on the contrary; are without points, and uniformly sharp. The phatagin is hairy on the belly, the pangolin not, and between the scales which cover his back, there is some thick and long hair like the bristles of a hog, which is not found on the back of the phatagin.

The pangolin is from six to eight feet long, including his tail, which is very near as long as his body, though it appears shorter when young. The scales are neither so large nor so thick; but as he advances in age, they acquire such a hardness, as to resist a musket ball. Like the ant-eaters, the pangolin and phatagin live chiefly on ants; they have also a very long tongue, a narrow mouth, and appear to be without teeth. Their body and tail are also very long, and their claws are nearly of the same length and form, but equal in number. Ant-eaters are found in America; the pangolin and phatagin in the East Indies, and Africa, where the Negroes call them quogelo, and eat their flesh, which they reckon wholesome food. They also use their scales for different purposes. The pangolin, and phatagin have nothing disagreeable but their figure; they are gentle, harmless, and innocent; feed upon insects only; never run fast, and only escape the pursuit of men by hiding themselves in rocks, or holes which they dig for themselves. They are two extraordinary species, not numerous, nor very useful; and their odd form seems to rank them as an intermediate class betwixt quadrupeds and reptiles.



THE ARMADILLO.

UNDER the general name of Armadillo, we may reckon several species which seem to us really distinct; in all of which the animal is coated with a crust that resembles bone. This external crust covers the head, neck, back, flanks, buttocks, and the tail to the very extremity. It is covered by a thin skin, sleek and transparent; the throat, breast, and belly, present a white grainy skin, like that of a plucked fowl. Besides, by viewing these parts with attention, you will perceive the appearance of scales which are of the same substance as the crust. This crust, however, is not of one piece, like that of the turtle; it consists of several joined to each other by as many membranes, which put this armour in motion. The number of these natural bands does not depend on the age of the animal; for the young armadillo and the adult have, in the same species, the same number. Father d'Abbeville has distinguished six species of the armadillo, but the principal difference between them consists in the number of divisions in the armour.

The armadilloes, in general, are innocent, harmless animals; but if they can get into gardens, they eat melons, potatoes, pulse, and roots. Though originally natives of the hot climates of America, they live in temperate regions. I once saw one in Languedoc, which was fed at home, and went every where without doing any mischief. They walk quickly, but can neither leap, run, nor climb up trees; have no other resource but to hide themselves in their holes, or if

they are at too great a distance from them, they contrive to dig one before they are overcome; for they are as expert as the mole in digging the ground; but are sometimes caught by the tail before they are out of sight; in which case they make such a resistance, that the tail is broken without bringing out the body: therefore to take them without mutilation the burrow must be opened. When they find themselves in the hands of their pursuers, they roll themselves up into a ball; and must be placed near a fire, to force them to stretch out their coat of mail; which, hard as it is, as soon as it is touched with the finger, the animal receives so sensible an impression, that it contracts in an instant. When they are in deep burrows, the method of forcing them out is to smoke them, or to let water run down the hole. Some pretend, that they remain under ground above three months without venturing out. It is true, they remain in their holes in the day time, and never go out but in the night to seek subsistence. The armadillo is hunted with small dogs, that soon overtake him, but he stops before they reach him, and contracts himself, in which condition he is carried off. If he finds himself on the brink of a precipice, he escapes the dogs and the huntsmen, by rolling himself up and precipitating himself without injury or prejudice to his scales.

These animals are fat, and very prolific. The female brings forth, as it is reported, four young ones every month, which makes their species very numerous. They are good to eat, and easily taken with snares laid for them on the banks of rivers and marshy grounds, which they prefer to every other place. It is pretended, that they are not afraid of the bite of the rattle-snake, and that they live in peace with these reptiles, which are often found in their holes. The savages make baskets, boxes, and other small vessels of their scales.



THE PACA, OR SPOTTED CAVY.

THE Paca, or Spotted Cavy, is an animal of the New World, which digs a burrow like the rabbit, to which he has been compared, though there is scarcely any similitude. He is much larger than either the rabbit or the hare; has a round head, and a short snout; is fat and bulky, and, by the form of his body, is more like a pig, in grunting, waddling, and manner of eating; for he grubs up the earth like the hog, to find subsistence. These animals inhabit the banks of rivers, and are found in damp and hot places of South America in great abundance. Their flesh is very good, and excessively fat. Huntsmen find it very difficult to take them alive; and when they are surprised in their burrows, which have two openings, they defend themselves with great obstinacy and bite with excessive fury. Their skin, though covered with short and rough hair, is valuable, because it is spotted on the sides. Men and animals of prey destroy a great quantity of them, yet the species is numerous. They are peculiar to South America, and are not to be met with in the Old Continent.



THE OPOSSUM.

THE Opossum is an animal of America, which is easily distinguished from all others by two singular characters. The first is, that the female has under her belly a large cavity, into which she receives, and suckles her young. The second is, that the male and female have no claws on the great toes of their hind-feet, which are separated from the others, like the thumb on the hand of a man; whilst the fore-feet are armed with crooked claws, like other quadrupeds.

The opossum is found only in the south parts of the New World; it does not dwell constantly in the hottest climates; and is found not only in Brasil, Guinea, and Mexico, but in Florida, Virginia, and other temperate regions of this Continent. It is very prolific: most authors say, it produces four or five young ones at a birth, others, six or seven. Marcgrave affirms, that he has seen six in the bag of a female; they were about two inches long, very nimble, and went in and out of the bag many times in a day: they are still smaller when just brought forth. Some travellers say, they are not larger than flies when they go out of the womb into the bag, and stick to the paps. This fact is not so much exaggerated as some may imagine, for we have seen in animals, the species of which is like that of the opossum, young ones sticking to the paps no larger than a bean. Hence we may presume that, in these animals, the womb is only the place of conception, formation, and the first unfolding of the foetus, which increases in the bag. Some authors say, they stick

to the paps for several weeks ; others, that they remain only in the bag the first month after they proceed from the womb. When they are strong enough to walk, they go out, and seek for subsistence ; and return to sleep, suckle, and hide themselves when terrified.

From the form of the feet of this animal, it is easy to judge, that it walks awkwardly, and seldom runs. One walking moderately may easily outstrip it. It climbs trees with great facility, and either hides itself among the leaves to catch birds, or hangs by the tail, the extremity of which is muscular and flexible as the hands ; so that it can squeeze, and even incurvate all bodies it seizes upon ; in this situation it remains a long time silently waiting for its prey. At other times, it balances itself to jump from one tree to another like the monkeys, which it resembles in the flexibleness of its tail, and the conformation of its feet. Though it be voracious and greedy of blood, it is neither wild nor ferocious : it feeds also upon reptiles, insects, sugar-canes, potatoes, roots, and even leaves and bark of trees. As it is easily tamed, it may be fed as a domestic animal ; but its smell is more offensive than that of the fox. Its figure is also forbidding ; for independently of its ears, which resemble those of an owl ; of its tail, which resembles that of a serpent ; and of its mouth, which is cleft to the very eyes, its body appears always very dirty, because its hair is neither smooth nor curled, but tarnished, as if covered with dirt. The bad smell of this animal resides in the skin, for its flesh is palatable : and the savages hunt, and feast on it with avidity.

THE MARMOSE, OR MURINE OPOSSUM.

THE Marmose, or Murine Opossum resembles, in most respects, the latter species. They are natives of the same clime, and continent ; and are very much alike in the form of the body, the conformation of the feet and tail, a part of which is covered with scales, the upper part only being hairy. The marmose is smaller than the common opos-

sum, his snout is sharper; the female has no bag under her belly, and has only two loose skins near the thighs, between which her young stick to the paps: when they are brought forth, they are not so large as small beans. The brood of the marmose is very numerous: we have seen ten small marmoses, each sticking to a pap, and the dam had four paps unoccupied. I am persuaded, that these animals bring forth a few days after conception: the young are then foetus only, which are not come to the fourth part of their growth. The dam always miscarries, and the foetuses save themselves by sticking to the paps, which they will not leave till they have acquired the growth and strength they would naturally have got in the womb.

THE CAYOPOLLIN, OR MEXICAN OPOSSUM.

THE Cayopollin, or Mexican Opossum, according to Fernandez, is a small animal little larger than a rat, and very much like the opossum in the snout, ears, and tail, which is thicker and stronger than that of a rat. He makes use of it, as we do of our hands; has thin transparent ears: and his belly, legs, and feet, are white. The young, when they are frightened, embrace the mother, who lifts them upon the trees. This species has been found on the mountains of New Spain.

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